FLORIDA HIGHWAYS

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Vol. III NOVEMBER, 1926 No. 11

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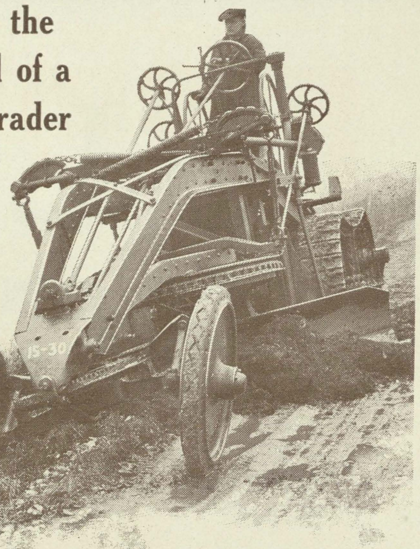

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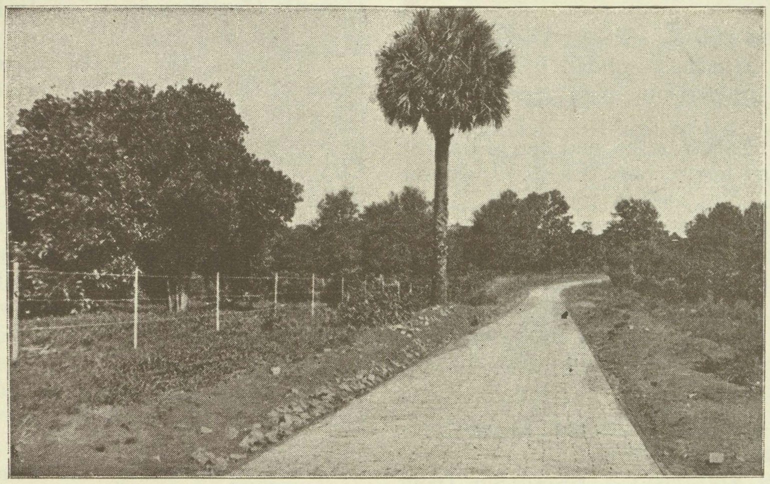


Vol. III NOVEMBER, 1926 No. 11

Transactions of the State Road Department

TALLAHASSEE, FLORIDA

October 15th, 1926

The regular quarterly meeting of the State Road Department of the State of Florida was held at the offices of the Department on Friday, October 15th, 1926. The following members were present: Dr. F. A. Hathaway, Chairman; E. P. Green, W. J. Hillman, J. Harvey Bayliss and I. E. Schilling. J. L. Cresap, State Highway Engineer; B. A. Meginniss, Attorney for the Department; W. P. Bevis, Acting Secretary, and H. J. Morrison, Highway Engineer for the United States Bureau of Public Roads were also in attendance.

Minutes of the meeting of the Department held July 6th were read and corrected, and, on motion of Mr. Bayliss, seconded by Mr. Green, were approved.

State Road No. 27—Location

The Chairman reported to the members that the agreements with Monroe, Dade and Collier counties carrying into effect the location of State Road No. 27 (Tamiami Trail) and the Department's program with respect to the construction thereof have been duly executed and filed and that the work in pursuance thereof is proceeding satisfactorily, contracts having been let and State forces placed thereon as heretofore authorized by the Department.

State Road No. 1

The Chairman reported to the Department that its program for paving State Road No. 1, is proceeding satisfactorily, contracts having been let for hard-surfacing in Columbia, Suwannee and Madison counties, and that an advertisement for bids for other paving in Madison County will soon be published. He further stated that county funds in Jefferson, Leon and Gadsden counties will shortly be made available to the Department for paving this road in those counties.

State Road No. 8—Highlands County—Project 630

Chairman Hathaway reported that the State Highway Engineer has made an investigation of the claim of Meyer Construction Company for additional compensation on Project 630, Highlands County, as directed at the last meeting, and has reported that this firm is not entitled to the additional compensation sought.

Resolution of Board of County Commissioners of Hillsborough County

There was presented and read a resolution adopted by the Board of County Commissioners of Hillsborough County expressing appreciation to the Department, its officers and employees and especially the Chairman and State Highway Engineer for the co-operation of the Department with said Board, and the full confidence of the Board and the citizens of Hillsborough County in the Department, and the assurance of the said Board that said County will gladly support said State Road Department to the fullest extent possible whenever opportunity arises.

On motion, duly made, seconded, and carried, the said resolution was ordered filed and the Secretary was instructed to write the Board expressing the grateful appreciation of the Department for these kind expressions.

Projects 669-V and 669-X—Collier County

Upon motion of Mr. Green, seconded by Mr. Hillman, the following resolution was unanimously adopted:

Resolved, That the Chairman be and he is hereby authorized to accept as surety on the bond of the contractor on Projects Nos. 669-V and 669-X, the United Brokerage Company, a Delaware corporation, in lieu of National Surety Company and that he be and he is hereby authorized to return to the contractor the said bond of National Surety Company for cancellation, upon receipt of bond duly executed by said contractor as principal, and said United Brokerage Company, as surety.

State Road No. 1—Okaloosa County Location Through Crestview

There was presented and read a resolution from the Board of County Commissioners of Okaloosa County requesting a revision of the location of State Road No. 1 through the Town of Crestview in said City. In connection with the same matter, the following citizens of said County appeared and were heard, namely: Purl G. Adams, County Attorney; W. J. Rice, B. J. Nettles, J. E. Donah, L. C. Powell, Mayor of Crestview, R. F. Frary, and Judge W. H. Mapoles. The Chairman informed this delegation that Mr. J. L. Cresap, State Highway Engineer, will go to Crestview to look over the situation to ascertain if the requested revision is practical.

Martin County—State Road No. 4

Upon motion of Mr. Schilling, seconded by Mr. Green, the following resolution was unanimously adopted:

Whereas, the Department has surveyed and located State Road No. 4 in Martin County, as is shown by Plat of said location on file in its office and on file in the office of the Clerk of the Circuit Court for said Martin County, and

Whereas, said Department has found and determined, and does hereby find and determine that it is necessary, wise and expedient to secure by purchase, condemnation, or otherwise sufficient lands as will make a width of thirty-three (33) feet on each side of the center line, as shown on said location Plat, for the purpose of a right-of-way for State Road No. 4;

Now, Therefore, Be It Resolved, That the County Commissioners of said Martin County be and they are hereby authorized through their counsel to prepare and sign, all the necessary pleadings and affidavits, and to take all steps necessary and required by the laws of Florida in condemnation proceedings for State Road purposes and that they be and they are hereby authorized to use the name of this Department in any proceedings necessary to carry out the purpose of this resolution, or to proceed in their own names as authorized by law;

Be It Further Resolved, That in the event that they should elect to proceed in the name of this Department, that their counsel be and is hereby authorized to prepare, execute and file all necessary pleadings, affidavits and documents in connection therewith, and to prosecute such action to completion.

State Road No. 4—Indian River County—Project 691

The following resolution, adopted by the Board of County Commissioners of Indian River County was presented and read:

"Whereas, the State Road Department of the State of Florida has requested this Board to secure the right-of-way for that portion of State Road No. 4 to be constructed by said Department from the North City Limits of the City of Vero Beach, Florida, to the South line of Indian River County, Florida, known as Project No. 691, and

"Whereas, This Board has made satisfactory progress in securing said right-of-way, and expects to have the same in its entirety within a short time, and is anxious that the State Road Department shall let a contract for the construction of said Road at the earliest possible moment and has requested said Department to advertise for bids therefor; now, therefore,

"Be It Resolved by the Board of County Commissioners of Indian River County, State of Florida: That the State Road Department be, and it is hereby requested to advertise for bids and to let a contract for the construction of said road along the location heretofore surveyed and designated by said Department, and that this Board hereby agrees to indemnify and save harmless the said State Road Department for any cost or loss that may result by delay or otherwise by reason of the failure of this Board to secure any part of said right-of-way, and that this Board does hereby further agree to defend at its own expense any litigation which may arise by reason of its failure to secure any portion of said right-of-way and to reimburse and refund to said Department any sums of money that said Road Department may be obliged to pay to any contractor or contractors by reason of any delay or damage which may arise because of hindrance to such contractor or contractors by property owners along said line of survey, by reason of the failure or neglect of said Board to secure in advance any portion of said right-of-way."

Whereupon, on motion of Mr. Schilling, seconded by Mr. Green, the following resolution was unanimously adopted:

Be it Resolved by the State Road Department that the proposal of Indian River County as contained and set forth in the above resolution be and the same is hereby accepted and approved, and that the Chairman of this Department be and he is hereby authorized to advertise for bids and let contract or contracts for the construction of that portion of State Road No. 4 in Indian River County between the north city limits of Vero Beach and the south line of said Indian River County, known as Project No. 691.

State Roads Nos. 15 and 17—Pinellas County

On motion of Mr. Green, seconded by Captain Hillman, the following resolution was unanimously adopted:

Resolved, That the Department take over for maintenance that portion of State Roads Nos. 15 and 17 in Pinellas County as of and effective October 1st, 1926.

Escambia County

A delegation composed of Messrs. R. C. Greenaway, of Pensacola; Frank J. Riera and L. S. Gilmore, County Commissioners of Escambia County, and W. E. Wheat, County Engineers of said County, appeared before the Department and requested that in view of the assistance rendered the Department by said county in the construction of State Roads Nos. 1 and 7, that the Department refund to Escambia County the amount of such assistance in excess of 50 per cent of the cost of such construction, the representatives of the county contending that Escambia County had an agreement with the Department to furnish 50 per cent of the cost of such construction, and that it has furnished an amount in excess of said fifty per cent. This matter was taken under advisement.

Award of Contracts

Upon motion of Mr. Schilling, seconded by Mr. Bayliss, the following resolution was unanimously adopted:

Whereas, bids were asked by the Department for the construction of the projects hereinafter designated, and

Whereas, the firms and individuals respectively named were low bidders thereon, Now, Therefore,

Be It Resolved, That the action of the Chairman in awarding and executing the contracts hereinafter named be, and the same is hereby, approved and confirmed; which said projects are as follows, to-wit:

Proj.	Contractor.	County.	Length.	Type.	Road.	Contract Cost.
589	H. E. Wolfe	Charlotte	8.16	Rock Base	5	$158,841.10
614	W. J. Bryson	Sarasota	17.08	C. G. & G.	5	118,086.63
634-B	Atlantic Bridge Co.	Jackson	456'	Conc. Bdg.	1	64,279.88
504	Duval Engr. & Contr. Co.	Columbia	9.41	Rock Base	1	162,319.42
669-C	R. C. Huffman	Dade	12.00	Grading	27	282,752.45
682	L. B. McLeod	Citrus	6.45	Rock Base	5	96,583.24
564-C	Wilson Pipe Co.	Charlotte	134'	Steel Bdg.	5	39,208.20
659	M. C. Winterburn, Inc.	Clay	13.27	C. G. & G.	3	121,213.14
655	H. E. Wolfe	Highlands	5.00	Rock Base	18	96,249.10
564-B	Broadbent Const. Co.	Charlotte	9.73	Rock Base	5	174,027.97
589	Thompson & Mosely	Charlotte	6.6	Ditch	5	12,424.42
663	W. P. McDonald	Citrus	8.03	Rock Base	5	125,768.90
48-B	Peterson & Earnhart	St. Johns	456'	Conc. Bdg.	4	74,273.56
49-B	F. M. Stuart & Co.	Flagler	200'	Conc. Bdg.	4	48,602.50
533	Baker & Foulks	Suwannee	13.47	Rock Base	1	226,737.02
669-V	Alexander, Ramsey & Kerr	Collier	11.91	Grading	27	347,847.00
669-X	Alexander, Ramsey & Kerr	Collier	9.39	Grading	27	94,695.00
592	Bennett Const. Co.	Franklin	7.89	C. G. & G.	10	43,423.41
565	Johnson, Drake & Piper	Madison	15.99	Conc. Pav.	1	422,064.88
687-A	E. W. Ellis	Lake	15.00	C. G. & G.	2	109,130.10
673-B	Peterson & Earnhart	Gadsden	418'	Conc. Bdg.	1	55,932.22
677-A	A. J. Hoffman	Levy	6.96	C. G. & G.	19	34,955.40
676-C	Langston Const. Co.	Levy	13.93	C. G. & G.	19	84,633.10
14	Preskett, Peterson and Blackburn	Santa Rosa	6.00	Conc. Shldr.	1	87,782.40
50-C	E. Roy James	Putnam	10.03	C. G. & G.	14	81,227.56
7	Duval Engr. & Contr. Co.	Hamilton	12.9	Rock Base	2	224,420.50
679	Wm. P. McDonald	Hernando	7.11	Rock Base	5	117,598 44
50-A	Boone & Wester	Putnam	6 18	C. G. & G.	14	64,939.48
660	Langston Const. Co.	Clay	10.52	Rock Base	3	164,199.74
619	J. L. Gladwell	Alachua	9.28	C. G. & G.	5	39,052.15
529	M. C. Winterburn, Inc.	Suwannee	12.70	Conc. Pave.	1	332,165.05
534	M. C. Winterburn, Inc.	Brevard	10.00	Repair	24	120,369.33
589	J. M. Parker	Lee	8.27	Repair	5	14,000.00

State Road No. 4—St. Lucie County—Project 692

There was presented and read the following resolution adopted by the County Commissioners of St. Lucie County:

"Whereas, The State Road Department of the State of Florida has requested this Board to secure the right-of-way for that portion of State Road No. 4, to be constructed by said Department from the North line of St. Lucie County running south to the south City limits of the City of Fort Pierce, Florida, known as Project No. 692, and

"Whereas, This Board has made satisfactory progress in securing said right-of-way, and expects to have the same in its entirety within a short time, and is anxious that the State Road Department shall let a contract for the construction of said road at the earliest possible moment and has requested said Department to advertise for bids therefor; Now, Therefore,

"Be It Resolved by the County Commissioners of St. Lucie County, State of Florida, That the State Road Department be and it is hereby requested to advertise for bids and to let a contract for the construction of said road along the location heretofore surveyed and designated by said Department, and that this Board hereby agrees to indemnify and save harmless the said State Road Department for any cost or loss that may result by delay or otherwise by reason of the failure of this Board to secure any part of said right-of-way, and that this Board does hereby further agree to defend at its own expense any litigation which may arise by reason of its failure to secure any portion of said right-of-way and to reimburse and refund to said Department any sums of money that said Road Department may be obliged to pay to any contractor or contractors by reason of any delay or damage which may arise because of hindrance to such contractor or contractors by property owners along said line of survey, by reason of the failure or neglect of said Board to secure in advance any portion of said right-of-way."

Whereupon, on motion of Mr. Schilling, seconded by Mr. Green, the following resolution was unanimously adopted:

(Turn to page 21)

ORGANIZED OCT. 8 1915

Florida Highways

Published Monthly
Official Publication of the State Road Department

PERSONNEL OF DEPARTMENT

F. A. Hathaway *(Jacksonville), Chairman*
(Official Residence, Tallahassee.)
E. P. Green, *Bradenton*
W. J. Hillman, *Live Oak*
J. Harvey Bayliss, *Pensacola*
I. E. Schilling, *Miami*
Walter P. Bevis, *Tallahassee, Acting Secretary.*

PERSONNEL OF EMPLOYEES IN GENERAL CHARGE OF THE WORK OF THE DEPARTMENT

Engineering Division

J. L. Cresap, Tallahassee	State Highway Engineer
L. K. Cannon, Tallahassee	Ass't. State Highway Engineer
G. L. Derrick, Tallahassee	Bridge Engineer
C. W. DeGinther, Tallahassee	Ass't. Bridge Engineer
Harvey A. Hall, Gainesville	Testing Engineer
F. W. Berry, Jr., Tallahassee	Office Engineer
John R. Stewart, Gainesville	Supt. of Equipment
R. L. Bannerman, Marianna	Div. Engr.—1st Div.
J. H. Dowling, Lake City	Div. Engr.—2nd Div.
R. J. Cassie, Fort Pierce	Div. Engr.—3rd Div.
L. B. Thrasher, Ocala	Div. Engr.—4th Div.
A. W. Kinney, Lakeland	Div. Engr.—5th Div.
R. C. Fergus, Fort Lauderdale	Div. Engr.—6th Div.
Henry Wilson, Punta Gorda	Div. Engr.—7th Div.

Accounting Division

S. L. Walters, Tallahassee	Accountant

This magazine is edited in the offices of the State Road Department, Tallahassee, and published monthly. Subscription rate, one dollar per year. Permission is granted to republish, with proper credit, the matter contained herein.

Application has been made for transmission through the mails as second-class matter.

B. A. Meginniss, Attorney for the Department,
Editor and Business Manager

Volume III November, 1926 Number 11

EDITORIAL

THOUGHTLESSNESS—OR VANDALISM

The State Road Department at great expense is placing along the highways of the State attractive metal markers or signs. They are placed there, not primarily for beauty, but for utility. The object is to make the roads serviceable in the highest degree as well as to promote safety to life and limb. Many and favorable have been the comments on the Department's program in this respect.

But even now, before the installation has been completed, it has been found that these signs are being used as targets by thoughtless marksmen. Bullet prints are growing more and more frequent and in many instances the entire sign and support have been demolished.

It is difficult to conceive the psychology behind this species of thoughtlessness or vandalism. It is possible that the individual's marksmanship may be improved, but after all, to what end? Certainly, no benefit accrues to the whole body of the people of Florida, who pay the bills, from this particular "sport." On the contrary, one of the most valuable adjuncts to the use of the road is destroyed.

The Department hopes that a mere mention of the serious aspect of this practice will be sufficient to end it in its incipiency. True, prosecution may lead to punishment of the particular offender, if caught in the act. It is doubtful, however, if these proud marksmen care to exhibit their skill in the presence of witnesses, and even if caught, punishment of the offender will not restore the sign.

Thoughtful citizens, of course, do not engage in this practice, and it is earnestly hoped that they will go further and assist the Department in every possible manner to protect the signs which make the road useful and serviceable.

PLANS FOR OUR DECEMBER ISSUE.

The American Road Builders will meet in January at Chicago. This meeting will be attended by our Chairman and State Highway Engineer, the former having been invited to preside at one of the sessions.

In connection with their visit to Chicago, they plan to make an exhibit of Florida's road construction, and in line with this plan they will have available for free distribution, a large supply of the December issue of Florida Highways.

With the thought of this use in mind, it is our purpose to make the December issue a pictorial edition. The printed text will be at a minimum. Beside our standing departments, such as progress of road construction and contracts let, there will be an article by the Chairman along a line to be determined by him. It is probable that the issue will be larger than the usual size, but in any event it will contain a great many views of Florida road scenes. We hope that we shall be able to make it our most attractive issue, and one which will make it a valuable souvenir for those attending the road meeting.

Building Highways for Safety

By PROFESSOR S. S. STEINBERG, University of Maryland

(Recent Radio Address from Station WRC at Washington, D. C.)

THE present is pre-eminently the age of individual transportation. There are to be found on our highways today more than twenty million motor vehicles, sufficient in number to supply one to each family in the United States. It is predicted that in seven years we will have one vehicle to every four persons, sufficient to furnish one to each individual that is old enough to reach the steering wheel. We travel about unhampered by fixed schedules, at speeds that annihilate time and space, and are limited only by the physical condition of our roads.

Although we are improving our highways at a rate never dreamed of before, we cannot keep pace with the demands created by the enormous increase in vehicles. Last year alone, more than 4 1-3 million motor vehicles were produced, an increase over the preceding year of 20 per cent. During this period about 40,000 miles of highways were surfaced, an increase of but 11 per cent. It is then evident that we are producing and absorbing motor vehicles twice as fast as we are providing roads upon which they may conveniently travel. This condition has brought about a traffic congestion on our streets and roads so acute that we have come to realize that one of the major problems facing the country today is to provide sufficient road and street capacity to permit safe operation of our vehicles. Our highway transportation system has been the means of bringing to each of our citizens advantages of an educational, social and economic nature such as are enjoyed by the people of no other nation.

The enormous increase in traffic on our limited mileage of improved roads, coupled with the ever-increasing speed and weight of motor vehicles, has meant not only a great economic loss, but has resulted in a steady increase in highway accidents, taking a toll in human life and property damage so great as to arouse public opinion to a demand for more extensive highway improvement to keep abreast of motor vehicle registration. The demand is for roads

Chipola River Bridge, Road 1, Jackson County. Showing what happened just after job was started so built and maintained as to permit quick and safe transportation at all times. Likewise, highway engineers now realize that safety is as important as engineering and economics in the design and operation of our highways.

As evidence of this development we might cite that the American Road Builders' Association, the largest organization of highway engineers, road contractors and road machinery manufacturers in the country, has selected as the chief topic for discussion at its next annual meeting the matter of highway safety. This meeting will be held at Chicago, during Good Roads Week, from January 10 to 14, 1927. It is the opinion of the members of this organization that safety on the highways will be best promoted by building wider roads; by a more extensive improvement of our secondary roads, thereby relieving the main highways of considerable local traffic; by properly posting warning signs where traffic hazards cannot be eliminated; and, finally, by securing the adoption of a uniform traffic code in all the States.

Road builders are making every effort to build safety *into* the road rather than depend upon warning signs and devices alone to protect the motorist. Many State highway departments, as for instance, Maryland, Connecticut, and Pennsylvania, as well as a number of large cities, are making a careful study of the causes of accidents occurring on their highways, and are thereby enabled to remedy unsafe conditions. Accident records are kept by means of a highway map on which a colored pin is inserted at the spot on the map where an accident has occurred. A different colored pin is used for each type of accident. An accumulation of pins shows in a graphic manner the location where a construction change is needed.

In the interest of safety, highway engineers are relocating the main roads to eliminate curves, to avoid railroad grade crossings, and to reduce steep grades. Incidentally, these relocations save distance, avoid costly bridges and mean large benefits to the motorist in the cost of vehicle operation. For instance, in Illinois a road 150 miles long was relocated almost entirely throughout its length, thereby saving 30 miles of unnecessary distance and eliminating 31 grade crossings. The saving in vehicle operation to the citizens of that State, as a result of this improvement, is estimated at one million dollars a year. Again, relocating the road from Kansas City to St. Louis, a length of about 300 miles, saved 41 miles in distance and eliminated 15 grade crossings, with an estimated saving in vehicle operation to the citizens of Missouri of $100,000 a year.

The frequency of highway accidents resulting from traffic congestion has demonstrated not only that we must construct our new highways of ample width, but also that we need to widen many of the roads and bridges now in use. This has led to the construction in the vicinity of large industrial centers and on main thoroughfares of what is known as the ''super-highway'' to insure the maximum road capacity, speed and safety. It is only by widening our congested roads, and by providing alternate routes, that accidents can be reduced and traffic enabled to move smoothly, quickly, and with a maximum degree of safety. Foremost of the super-highways is the one out of Detroit. This road has a total width of 204 feet, with two separated roadways 44 feet wide, each carrying one-way traffic. On each of the four-track roadways horse-drawn traffic keeps to the right hand curb; slow-moving heavy trucks outside them, and automobiles in the two other lanes, thereby providing rapid, safe, and easy movement for all kinds of traffic. In addition, space is provided between the roadways for rapid transit trolley lines, and provision is made for motor parking, as well as for pedestrians. Other highways on which extensive widening programs are going on, or parallel routes are being extended, are the Pacific Highway in the State of Washington; highways out of Chicago; the Lincoln Highway west of Philadelphia; the Boston Post Road between New York and New Haven; as well as roads leading out of Cleveland, Akron and Cincinnati.

One of the developments of the future may be separate roads for freight and for passenger service; a low grade, heavily constructed road for trucks and a less expensive type for passenger vehicles. A road planned primarily for trucking between Boston and New York is now under construction.

To relieve traffic congestion and to promote safety at the intersection of important roads, highway grade separations are now being planned. The first structure of this kind is now being erected just north of Chicago at a very congested highway intersection. The design provides for two levels. Through traffic proceeds on an overhead bridge on one of the roads while turning traffic swings wide of the bridge and uses the ground level.

Traffic congestion, as well as a large proportion of accident cases, may be charged to the slow-moving vehicle. As the speed of the vehicle materially affects road capacity, it is possible that one of the developments of the future in the interest of safety and highway efficiency may be a penalty for not maintaining a minimum, as well as for exceeding a maximum speed.

Statistics show that more than half the motor vehicles in the United States are owned and largely operated in urban communities of 5,000 population and over. When in addition to the local traffic, all through non-stop traffic is also made to pass down ''Main Street,'' congestion must result. This condition has forced the attention of large communities to the desirability of routing through traffic around the edge of the town rather than into the business district. In Philadelphia, a belt line has been provided for routing through traffic around the edge of the city; while in Delaware the DuPont Highway, which extends the entire length of the State avoids passing through built-up sections.

One of the most recent experimental developments in the interest of public safety is lighting the rural highway at night. The greatest menace of night driving is the abundance of glaring lights which makes driving at such times dangerous. It is found that a large percentage of highway accidents occur at night due to this cause. Lighting the highway not only reduces this danger, but also increases the capacity of the road by making it available for maximum use throughout the 24 hours of the day, and serves as an inducement for trucks to operate at night when passenger traffic is at a minimum. Highway illumination is now in use between Albany and Schenectady, on the Lincoln Highway in Indiana, on the motor causeway out of Miami, and on some roads out of Detroit.

An important step to promote highway safety was recently taken by the United States Bureau of Public Roads in co-operation with the State highway departments, in adopting uniform standards for warning signs to be used throughout the country. The motorist will no longer be confused by a multiplicity of signs of various designs and degrees of legibility. Hazards will be indicated by signs which will be uniform in all States and which will plainly indicate the kind and degree of danger. The new signs make use of a system of different shapes, thereby increasing their value at night. The shape indicates the degree of hazard and if the motorist cannot read the legend, the shape will tell him the degree of caution required.

In this system a round sign indicates a railroad crossing; a diamond-shaped sign calls for a reduction of speed, as at a curve or narrow bridge; an octagon sign indicates a complete stop, or necessity for proceeding slowly with car under control; a square sign indicates a lesser degree of caution than any of the others, such as a school zone or a side road. Twenty States are now actually engaged in erecting these standard warning signs, and the other States have signified their intention of erecting them in the immediate future.

The highway engineer is bringing science to bear upon the solution of the problems of highway safety. To-day but a very small percentage of accidents on our main roads can be attributed directly to engineering defects. No public work is of greater importance than that of widening and extending our present roads, as well as paving new ones to meet our constantly increasing need for adequate highway facilities. Every effort is being put forth by the highway engineer and the road builder, with the limited funds at their disposal, to make the public highway a safer and a better place upon which to ride.

WHEN LIGHTNING STRIKES A ROAD

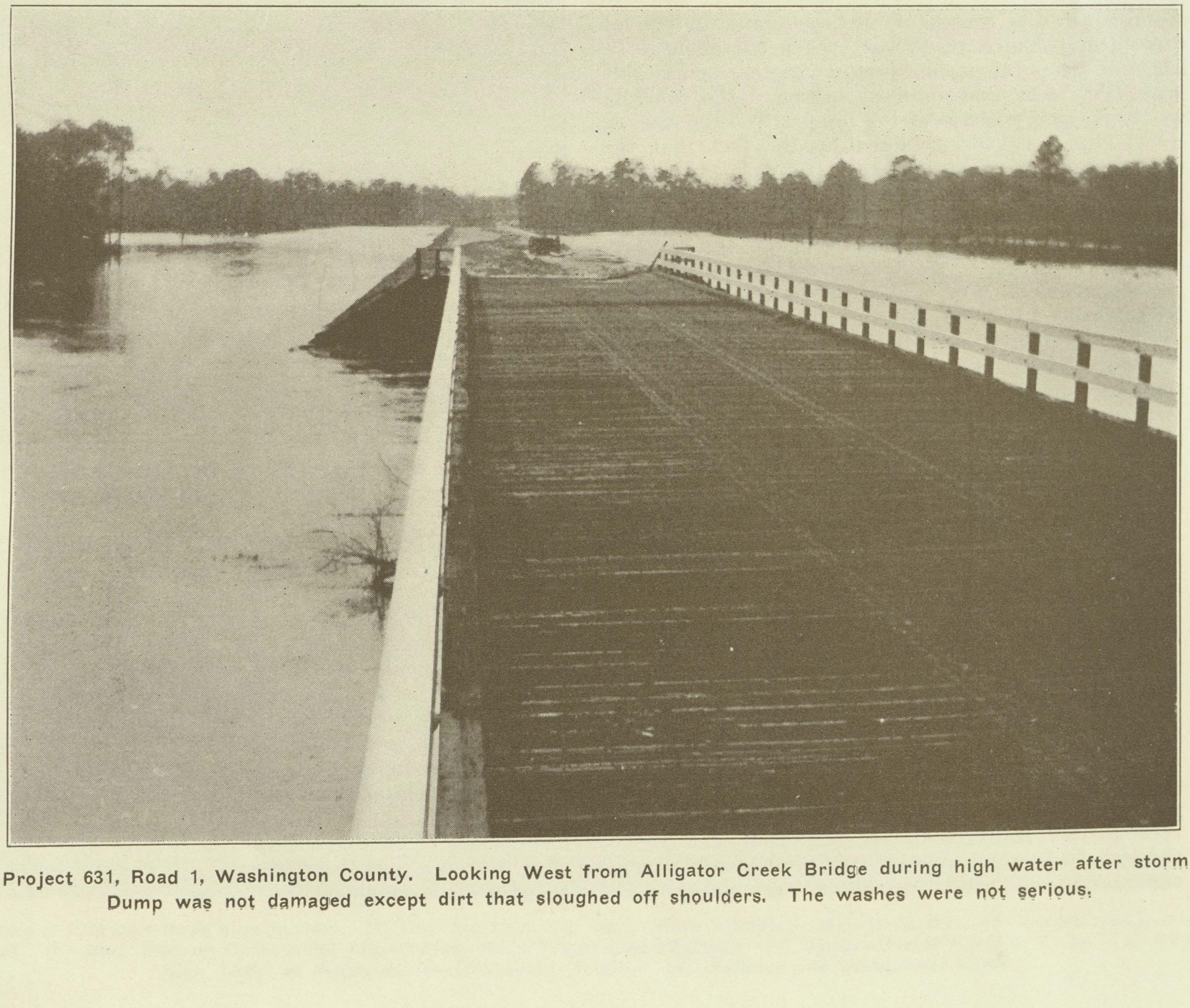
Effect on Reinforced Concrete Pavement Described in September Proceedings American Society of Civil Engineers

By WINSTON E. WHEAT

Chief Engineer, Department of Roads and Bridges, Escambia County, Pensacola, Fla.

The varied results of the action of the elements on rigid pavements has recently been the subject of much scientific investigation. Changes in temperature, frost action, and differences in moisture conditions create problems of real significance to the engineer engaged in the design of pavements, the importance of which can hardly be over-estimated.

The writer has recently had occasion to investigate the effect of another of Nature's forces—its most spectacular if not its most powerful—in contact with a reinforced concrete pavement. On the evening of October 12, 1925, during a thunderstorm in the vicinity of Pensacola, Florida, an 18-ft. reinforced concrete pavement on the "Gulf Beach Highway" was struck by a bolt of lightning. The result was one quite contrary to that expected, and only a careful



Project 631, Road 1, Washington County. Looking West from Alligator Creek Bridge during high water after storm. Dump was not damaged except dirt that sloughed off shoulders. The washes were not serious.

investigation proved that the damage done to the pavement was the effect of the action of that element. This inspection was checked by B. D. Howe, Assistant Engineer, Louisville & Nashville R. R. Co.

At first thought, it would seem that lightning, striking a concrete pavement laid directly on plane of sub-grade, would choose the shortest way to the earth, going directly through the slab. Instead, in this case, it traveled the pavement for a distance of 1,560 feet, about 780 feet in each direction.

No damage to the pavement is evident except at the expansion joints, at 30-ft. intervals, where a gap of about 4½ inches between the ends of the longitudinal wires of the steel mesh reinforcement, evidently formed an arc, suddenly generating heat sufficient to break out a small piece of concrete and scattering the aggregate for a considerable distance. Where the wires were bared, the galvanization was found to have been burned off. In all cases, the ⅝-in. asphalt expansion joint was melted away at the point of break, evidently having literally "gone up in smoke."

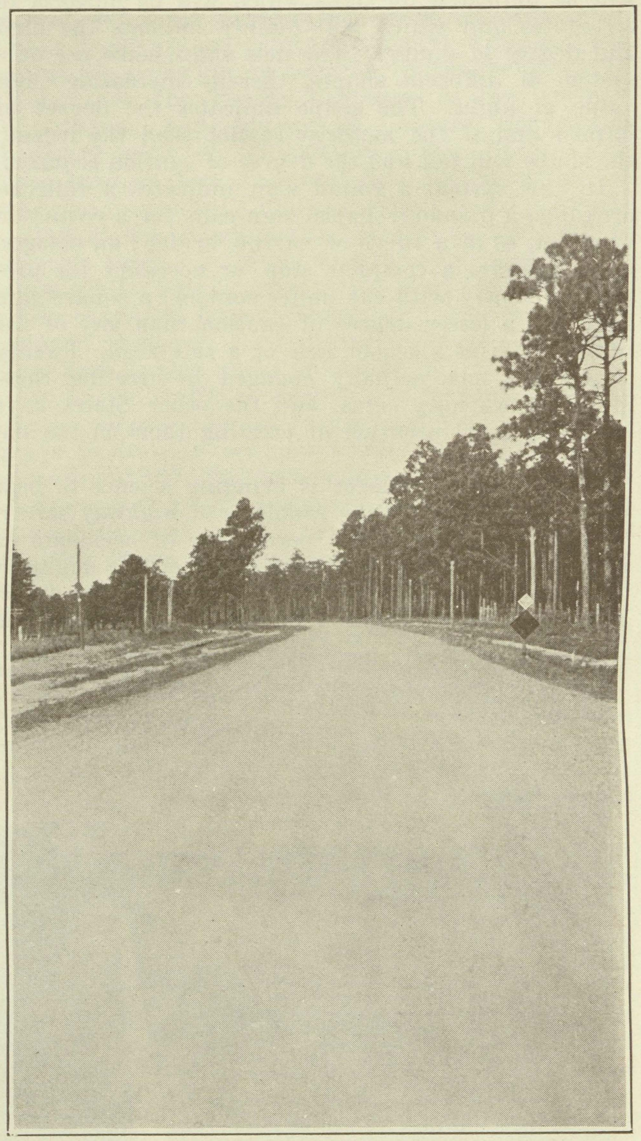
At each joint over the affected area only a small piece of concrete was broken out, or cracked, usually in a triangular shape at a corner of the slab, the piece being about 1 sq. ft. in area and extending slightly below the level of the reinforcement which was 2 in. below the surface. An interesting feature of the action of the lightning was that pieces of concrete broke out in nearly all cases on alternate sides of the road, as if it had traveled diagonally across the reinforcing mesh in each slab. In two cases the fracture occurred in the center of the road, and in one of these a cup-shaped piece was broken out about 4 ft. back of the expansion joint. Another noticeable peculiarity was that in most instances the concrete was broken on one side of the joint, only—the eastern side. This may be explained by the fact that the road was constructed from east to west. In laying the mesh, which came in sections, the ends were placed a varying distance back from the expansion joints, the exact amount depending on the overlapping of the sheets of reinforcement in the slab.

The pavement is of a 5½-7½-5½-in. cross-section, 18 ft. wide, of 3,000 lb. concrete. The aggregates were washed river sand and gravel. In the breaks the coarse aggregate was fractured, as a rule, rather than the mortar.

The reinforcement consisted of a standard steel wire mesh, weighing 44 lb. per 100 sq. ft., and of ¾-in. round steel bars, placed parallel to and 4 in. back of the expansion joints.

The explanation of the effects of the lightning, as reached by Mr. Howe and the writer, may be outlined as follows: This pavement is laid on a pure, white, beach sand of indefinite depth. An unusually dry period had greatly lowered the ground-water level. Moisture is essential to "grounding" lightning. Having struck the pavement the current ran down the steel wire to the end of the mesh near the expansion joint. There the line of least resistance was taken, which was across the width of the pavement, following to its end the steel bar located at that point. Then followed the arc to the steel located across the joint, as this afforded less resistance than to pass through the concrete to the sub-grade and thence through 20 feet, or more, of dry sand to where moisture conditions would permit a "grounding."

The slight damage done was easily repaired by filling the cavities with gravel and bituminous mixture. No other part of the road, which is 12¾ miles in length, has shown any breaks during the two years it has been open to traffic, and the reinforcement has effectually prevented serious cracking of the slabs.—Roads & Streets.



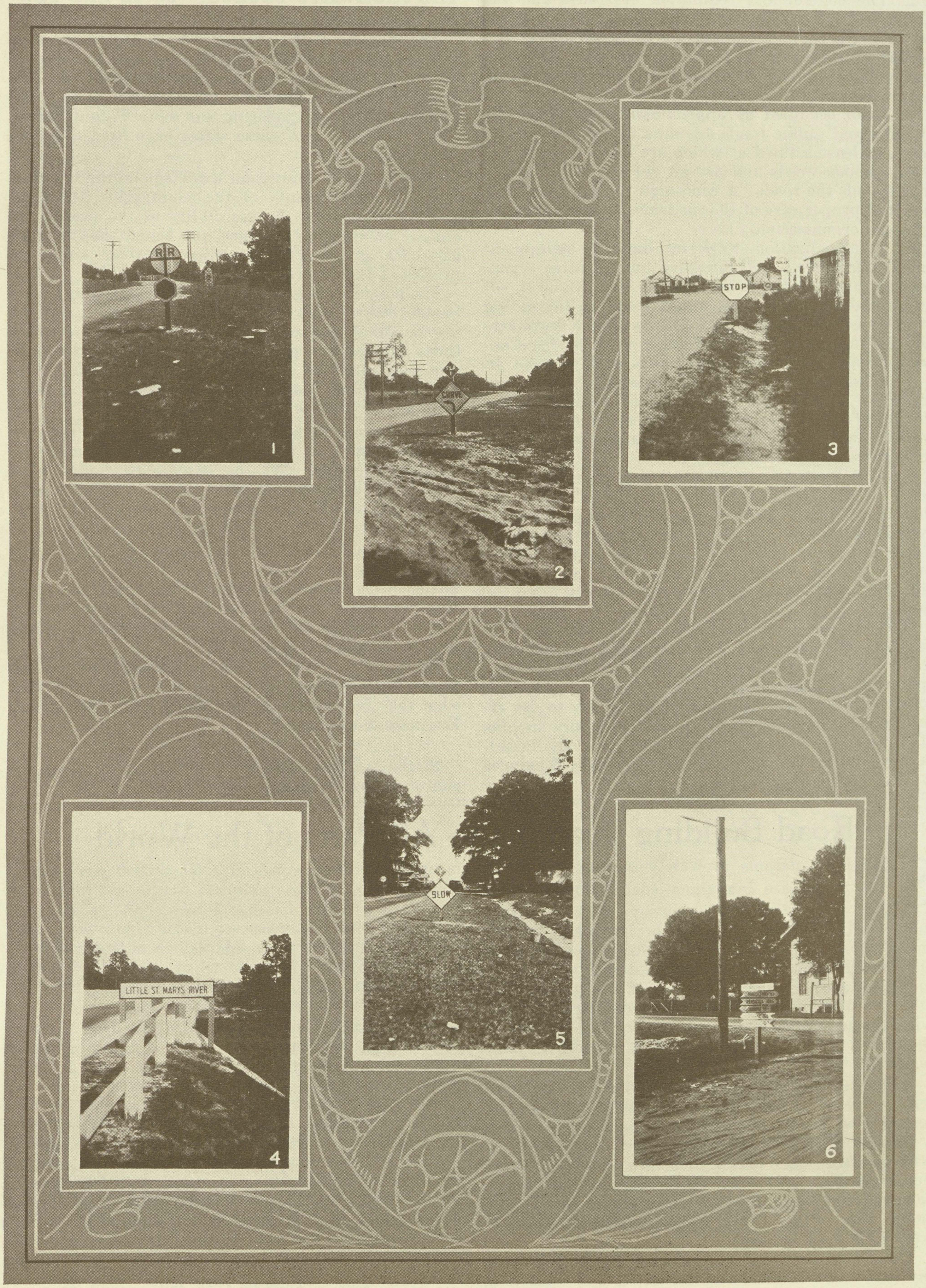
Project 639, Road 1, Gadsden County. Sand clay surface with gravel veneer.

WHERE FUNDS ARE NEEDED IN THE HIGHWAY INDUSTRY

Without going afield there is pressing work for road builders' organizations that requires men and money. Such work should be for the general benefit of the industry, i.e., stabilize conditions, reduce waste and increase the scope and strength of the industry.

Just to list some of the projects that are crying for men and money:

1. Fundamental research is essential to continued growth. Foundations for the study of special problems should be created such as, for example, the study of reinforcing steel in progress which has opened new avenues of development.



Views of Florida's Road Sign System. (1) Railroad Crossing Sign. Note Automatic Red Reflector. (2) Directional Curve Sign. (3) Stop Sign on Cross Road Approaching Main Trunk Line Highway. (4) Designation of Name of River. (5) Slow Sign Used at Approach to Congested Traffic. (6) Distance and Directional Signs.

2. The control and regulation of traffic and the unification of traffic rules throughout the various States needs an immense amount of study and public education. Teaching 120,000,000 people the basic traffic rules would save the lives of thousands of people annually.

3. Land occupied by approximately 500,000 miles of improved public roads amounts to about 7,500,000 acres, at least a third of which are barren or covered with noxious weeds and are an eyesore to the public that travels the roads. A campaign for the beautification and proper care of the roadsides must be financed by some organization.

4. Standardization work on highway equipment and methods by a well-informed and effective organization that has the confidence of both highway officials and manufacturers would result in the saving of hundreds of thousands of dollars to both taxpayers and manufacturers. The effective work of the Concrete Mixer Association stands as a mark to shoot at.

5. Elimination of waste of legislative effort, materials of construction and administrative control—the fostering of production engineering in highway work is awaiting the financial encouragement of some far-sighted highway organization.

6. And most important, the public service character of the highway industry makes it imperative that there should be most thorough organization for mutual protection and the extension of the industry. There are many battles to be fought on the field of public opinion, some of which are now in progress, and the fights should be led by the highway organizations.

Without going far afield there is endless work to be done. We commend this work to the organization leaders and at the same time offer the unlimited cooperation of Highway Engineer & Contractor in such constructive work. There are many places to use effectively for the benefit of the industry any surplus of funds which have been freely given by broad-minded industrial organizations.—Highway Engineer & Contractor.

THE HIGHWAYS BECKON, "COME AND SEE"

There exists in the average citizen an irrepressible urge to go and see for himself how people live elsewhere. During the past summer hundreds of thousands of automobiles have traveled far from home and delved into neighboring and more distant States. The visible assets of these states have been disclosed to all eyes.

Where a good impression was made on the travelers by the natural beauty of the countryside, the character of the roads, the hospitality of the people, the climate or other advantages, the benefit to the State has been great. The returning traveler sings the praises of the favored land to many people.

The magnificent gridiron of highways in the United States over which now 17,000,000 motor vehicles travel almost unceasingly is destined to grow to ten times its present size. Then indeed will the States be unmasked and the good and the bad in each section will be common knowledge to people living in other sections, for they will have "gone and seen."

The appearance of the roadsides has not received the attention that has been devoted to obtaining a smooth pavement. Yet the impression gained of a road is not entirely that obtained from the character of the surface. The motorist's impression is of a composite nature.

The saying that the dollar follows the highway is as true today as it was in the early days of pioneer settlement. Florida, California, Wisconsin and New England have proved that fact as regards tourist travel. Consider the number of cars that annually visit the scenic national parks.

Men will "go and see for themselves" and it behooves the residents of any section to see to it that what they see is pleasing and worth while.—Highway Engineer & Contractor.

Statistics show that 80 per cent of all gasoline manufactured is used in motor-driven vehicles.

Road Building Booming in All Parts of the World

SEVERAL nations in widely-separated parts of the world are launching comprehensive plans for upbuilding the highway systems within their borders. This is seen to be the result of two things. One is that the United States has given an eloquent demonstration of the speed with which good highways accelerate the processes of civilization. The other is that the people of other countries see that, with cheap automobiles available, the one big bar to their own internal development is a lack of these highways.

Mexico sprang into a place in world highway matters in March, 1925, when the Mexican Congress passed laws creating a Federal system and provided a fund of $6,000,000 annually, partly through a 5.7 cent gasoline tax. The system now under construction comprises 1,337 miles. Gravel, penetration macadam and a volcanic stone, "tezontile," is being used, along with other types more or less familiar to American road builders.

The region surrounding Valencia, Spain, taking in the provinces of Valencia, Alicante, and Castellon, is utilizing the proceeds of a 60,000,000 peseta loan, negotiated in 1925, to complete streets and important highways. Square basaltic stones with smooth surfaces are being laid wherever traffic is heaviest, while on the less-used sections cobblestone is being laid, or if now in place, is being taken up and replaced on a concrete base. Asphalt is also being used. This work is to be completed in five years.

The Japanese Government has decided on a tentative 10-year construction program of building motor roads, to cost about 160,000,000 yen. The Government is to provide about 50,000,000 yen, the remainder to be raised by localities, much as Federal Aid is matched at home. The 1926 budget included the equivalent of $6,000,000 for a 287-mile highway.

Cuba, coming closer home, is arousing the interest of all of us by preparing to spend $9,000,000 yearly on a comprehensive system of industrial and tourist motor roads. It is prophesied by Cuban officials that within ten years the auto registration will jump from 30,000 to 400,000 following these road improvements.

(Turn to Page 12.)

Contracts Awarded by State Road Department January 1, 1926—November 13, 1926

Contractor	Project No.	County	Length Miles	Length Feet	Contract Plus 10%	Type
Noonan-Lawrence	51	Escambia	6.25	....	$ 206,575.89	Concrete
J. S. Walton & Co.	648-B	Hardee	....	615	83,228.09	Conc. Timber
Chas. F. Wilmore	641-A	Palm Beach	11.36	....	86,081.38	Grade
Gillis Const. Co.	644-A	Wakulla	8.49	....	47,367.49	Grade
L. M. Gray	617-618	Alachua	16.06	....	248,123.10	R. Base
Montgomery & Parker	633-B	Gadsden	....	240	39,591.47	Conc. Bridge
Peterson & Earnhart	672-B	Leon	....	1950	197,377.45	Conc. Bridge
Concrete Steel Bridge Co.	641-B	Palm Beach	....	237	120,766.80	Conc. Bridge
Concrete Steel Bridge Co.	656	Palm Beach	....	727	222,200.60	Conc. Bridge
American Bascule Bridge Corp.	641-656	Palm Beach	....	120	63,573.40	Bascules
J. W. Hall	689	Alachua	1.67	....	10,599.42	Grade
H. E. Wolfe	562-A	Highlands	5.37	....	142,837.33	S. T.
C. A. Steed & Son	694-694-A	Martin-St. Lucie	8.48	....	61,599.45	C. G. & G.
Boone & Wester	693	St. Lucie	8.73	....	59,670.88	C. G. & G.
Duval Engineering & Contr. Co.	31	Hamilton	11.82	....	241,489.11	R. Base
F. S. Whitney	642	Putnam	10.18	....	210,025.00	R. Base
Wm. P. McDonald	675	Polk	5.16	....	256,969.88	S. A.
Noonan-Lawrence	500-A	Bay	9.65	....	334,691.65	Concrete
R. H. H. Blackwell	693	St. Lucie	....	160	80,466.96	Concrete
C. A. Steed & Son	694-694-A	Martin-St. Lucie	....	327	125,796.52	Concrete
W. P. McDonald	648	Hardee	1.00	....	31,363.20	R. B. S. T.
Gilbert & Hadsock	676-A	Levy	9.95	....	48,875.58	C. G. & G.
McLeod Const. Co.	676-B	Levy	14.39	....	135,259.30	C. G. & G.
Peterson & Earnhart	673	Gadsden	....	20	10,727.20	Concrete
Atlantic Bridge Co.	38	Escambia	....	....	28,260.98	Surface
Lake Worth Const. Co.	543	Seminole	14.20	....	109,759.62	C. G. & G.
A. Bentley & Son Co.	621-C	Okaloosa	....	1363	147,295.80	Concrete
A. Bentley & Son Co.	621-B	Okaloosa	....	1568	157,361.60	Concrete
E. F. Powers Construction Co.	668	Brevard	13.45	....	119,128.58	C. G. & G.
E. F. Powers Construction Co.	564-C	Charlotte	3.93	....	42,264.98	C. G. & G.
L. M. Gray	595	Volusia	6.43	....	122,022.17	R. Base
B. Booth & Co.	53-A	Lake	7.09	....	60,252.65	C. G. & G.
H. E. Wolfe	589	Charlotte	8.16	....	174,725.21	R. Base
W. J. Bryson Paving Co.	614	Sarasota	17.08	....	129,895.29	C. G. & G.
Atlantic Bridge Co.	634-B	Jackson	....	456	70,707.86	Concrete
Duval Engineering & Contr. Co.	504	Columbia	9.41	....	178,551.36	R. Base
R. C. Huffman Const. Co.	669-C	Dade	12.00	....	311,027.69	Grading
L. B. McLeod Const. Co.	682	Citrus	6.45	....	106,241.56	R. B.
Wilson Pipe Co.	564-C	Charlotte	....	134	43,123.52	Conc. & Steel
M. C. Winterburn, Inc.	659	Clay	13.27	....	133,334.45	C. G. & G.
H. E. Wolfe	655	Highlands	5.00	....	105,874.01	R. Base
Broadbent Const. Co.	564-B	Charlotte	9.73	....	190,330.76	R. Base
Thompson & Moseley	589	Charlotte	6.66	....	10,916.86	Conc.
Wm. P. McDonald Const. Co.	663	Citrus	8.03	....	138,345.79	R. Base
Peterson & Earnhart	48-B	St. Johns	....	456	81,700.91	Conc. Bridge
F. M. Stuart & Co.	49-B	Flagler	....	200	62,967.30	Conc. Bridge
Baker & Foulks	533	Suwannee	13.47	....	249,410.72	R. Base
Alexander, Ramsey & Kerr	669-V	Collier	11.91	....	382,631.70	C. G. & G.
Alexander, Ramsey & Kerr	669-X	Collier	9.39	....	104,164.50	C. G. & G.
Johnson, Drake & Piper	565	Madison	15.99	....	464,271.36	Concrete
E. W. Ellis	687-A	Lake	15.00	....	120,043.11	C. G. & G.
Peterson & Earnhart	673-B	Gadsden	....	418	61,525.44	Conc. Bridge
A. J. Hoffman	677-A	Levy	6.96	....	38,450.94	C. G. & G.
Langston Const. Co.	676-C	Levy	13.93	....	93,096.41	C. G. & G.
Preskett, Patterson & Blackburn	14	Santa Rosa	6.00	....	96,568.34	Conc. Shldrs.
E. Roy James	50-C	Putnam	10.03	....	89,350.31	C. G. & G.
Duval Engr. & Contr. Co.	7	Hamilton	12.90	....	246,862.55	R. Base
Wm. P. McDonald	679	Hernando	7.11	....	129,358.28	R. Base
Boone & Wester	50-A	Putnam	6.18	....	71,433.42	C. G. & G.
Langston Const. Co.	660	Clay	10.52	....	180,619.71	R. Base
J. L. Gladwell	619	Alachua	9.28	....	42,957.36	C. G. & G.
M. C. Winterburn, Inc.	529	Suwannee	12.70	....	365,381.55	Concrete
M. C. Winterburn, Inc.	534	Brevard	10.00	....	132,405.26	Repair
J. M. Parker	589	Lee	8.27	....	15,400.00	Shoulders
Tampa Sand & Shell Co.	53-C	Lake	1.87	....	113,087.04	C. G. & G.
The Erler Corporation	682	Citrus	....	247	60,573.90	Overhead
Coastal Const. Co.	677-B	Levy	11.58	....	161,287.36	C. G. & G.
Mason Payne Co., Inc.	691	Indian River	5.52	....	95,138.91	C. G. & G.
Boone & Wester	692	St. Lucie	7.38	....	130,489.86	C. G. & G.
L. M. Gray	676-A	Levy	9.96	....	142,354.12	R. Base
L. M. Gray	676-B	Levy	14.39	....	205,463.80	R. Base
Total			419.16	9238.0	$9,329,457.80	

ROAD BUILDING BOOMING

(Continued from Page 10.)

South America is making phenomenal progress in transportation. The few highways now in use have bus lines operating over them, and while funds are scarce, almost every country is building highways.

Montevideo is preparing to build a highway that will make Buenos Aires only six hours distant from Montevideo by automobile. The fastest time by boat is now nine hours, and the completion of this route will cause an important readjustment of trade and transportation between the two countries.

Peru has built many miles of highways, some under extreme difficulties. Roads are now under construction at what is believed to be the highest altitude ever reached by a highway. All able-bodied men of Peru are required to work several days a year on highway construction or pay a liberal amount to the road fund.

In Europe, Sweden and Norway are pushing forward not only in highway construction but in bus operation. The U. S. Chamber of Commerce reports that on June 1, 1925, there were 1,050 bus lines and 2,500 cars in operation and that today there are 1,300 lines over which nearly 3,500 licensed vehicles are operating, covering a total distance of 35,000 kilometers.

This world-wide phenomenal burst of transportation development is only of passing interest to road builders here in the United States, so engrossed are we with the work at hand. But we should give more than passing notice to the fact that other nations not only are buying our motor cars, but are looking to us for methods, and in many cases are relying on American equipment and engineers to build their roads.—The Highway Magazine.

UNPLEASANT SIGHTS ON COUNTRY ROADS

Too often as the motorist drives through the country, he sees barns, old buildings and fences plastered with unsightly advertising matter. Battered posters telling the wonders of circuses and shows, long since moved on, are partially covered by gaudy signs describing the merits of various articles of merchandise. The effect is not a happy one. If the country is at all pleasant, the outdoor advertisements produce somewhat the sensation of a jazz band competing with a symphony orchestra.

A great many lovers of beauty would prohibit all roadside advertisements. Possibly such a course would not be practical. However, it seems, if they consider outdoor advertising worth while, that business men would make certain that their announcements interfere with the harmony of the natural landscape to the smallest possible extent. Governmental interference always looms as a possibility.—Jackson (Mich.) Citizen Patriot.

F. A. Project 41. State Road No. 4, Dade County.

The Aesthetic Features of Highway Bridge Design

By C. A. MELICK, Bridge Engineer, Michigan State Highway Department

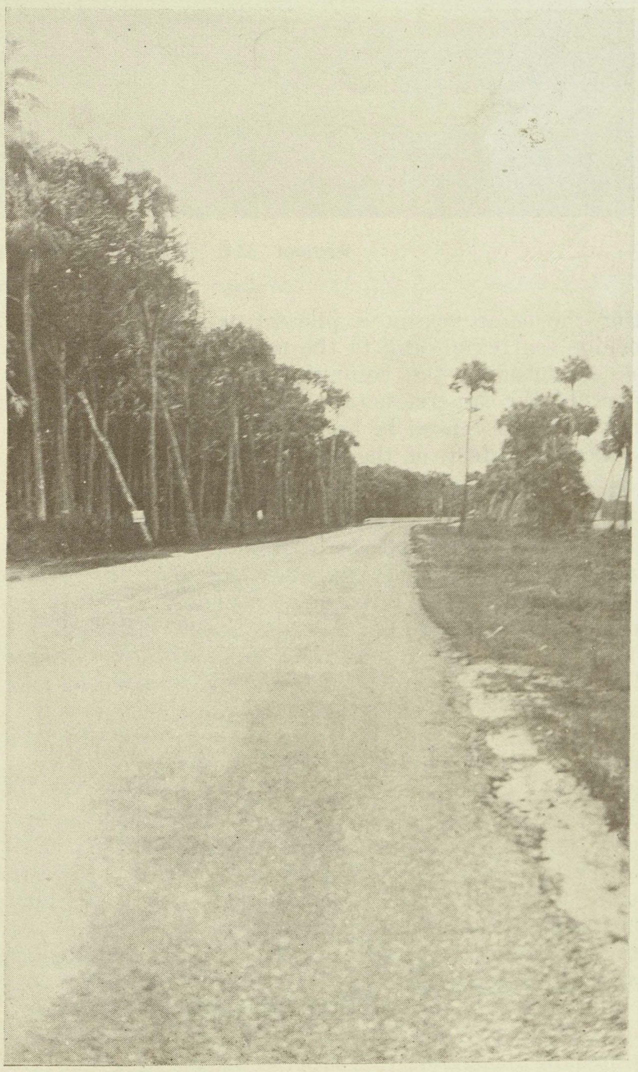
OF all of the various refinements of Engineering Design it is believed that the quality known vaguely under the name of Aesthetics is by all means the most elusive to apply. Aesthetics are most often thought of in connection with Architectural Work and the Arts of sculpture and painting. Bridge design, particularly as applied to the smaller structures on our highways, has very generally been considered as a function of dollars and the multiple use of plans. In any modern highway organization these two latter items will, through the pressure of necessity, continue to be the most important factor of design but, since 1920 the Michigan State Highway Department has, in common with the more progressive Departments of other States, given considerable study to and added a slightly increased cost in an attempt to dignify and beautify its structures. Like most folks bent on art the Engineer is always keen for criticisms and suggestions and he soon learns that what is appreciated by some is an eyesore to others and, if he were to assume that all individuals had uniformly good taste, the approval of the general public would be about as well assured as the outcome of a horse race. Having the courage of our convictions and venturing only within conservative limits the general attention paid to aesthetic features will be briefly outlined.

Making Flat Surface Pleasing

Fundamentally it is recognized that a flat surface can be made pleasing by either outline, relief shadows, or a combination of the two treatments. A flat surface of any appreciable size in a material such as concrete which is commonly subject to defects and local failure would be much improved by breaking the surface up into smaller surfaces by panelling, pilaster treatment, or belt courses; by indenture or relief offsets to confine such defects as shrinkage cracks in the shadowed surface resulting; or by roughening the surface finish in such a manner as to confine checks, soft stone or clay blisters, etc., within the fine shadow lines produced by the roughened finish.

The selection of projecting outlines to produce a combination of light and shadow which is harmonious and in keeping with the utility of the structure and which can be secured without too large increased cost is the major problem. Great opportunity for such treatment is economically provided by the desirability of keeping the size of concrete casts within the limits of an easy day's work in order to avoid unsightly work planes when weather or accident or poor equipment delay the casting.

All of our vertical joints are faced with a three-fourths inch strip of 45-degree-90-degree triangular moulding which provides just enough shadow to make the fine hair crack, resulting from construction, nearly invisible and confined to the straight line of the plans. Our horizontal construction joints are usually topped by a belt course which places the construction line in the shadow of the belt. For certain work the three-fourths inch triangular moulding is used for such joints. The use of this small moulding does not form a shadow so conspicuous as to form at a reasonable distance away any outstanding design shadow. Panelling by triangular moulding and recessed surface gives a secondary relief intermediate between the moulding indenture and that of a projecting surface and adds softness to the bolder outlines of the surfaces. The Bridge Seat usually forms the first occasion for any real horizontal treatment above the ground surface and usually marked shadow treatment is desirable here. The next horizontal line to consider is the underclearance line of the Spans. This line should be set higher than the Bridge Seat by at least six inches if possible since the purpose of the seat is to receive and spread the concentrated loadings from the spans and a vertical treatment, even if very short in height, is necessary or at least desirable to set forth this function of the bearings.



F. A. Project 40-D. Road No. 4 in Brevard County, South of Indian River City.

Project 534. Kissimmee-Melbourne Road (State Road No. 24).

For the same reason a pilaster treatment over the bridge seat extending to the top of curb is desirable as emphasizing the column action function of this part of the superstructure, and this pilaster should for the same reason be an integral part of the superstructure instead of the substructure, if feasible.

Treatment of Substructure Designs

Probably one of the most difficult substructure designs to treat in an aesthetic manner is the flaring sloping wing wall. The plain designs so universally in use without any attempt at harmonious treatment mar a large number of otherwise beautiful structures. The battered and sloping lines clash with every other line of the structure. A wide coping, unbattered face surfaces, and curves at changes in slopes are wise investments for such designs. In our work this condition is not often encountered since the contingency of future widening of superstructures for either increased roadway or sidewalks make it almost imperative that abutments of the U type shall be used. This latter type provides a wonderful possibility for harmonious treatment. It permits long sweeping horizontal (or cambered) lines of the superstructures, facias, and railings to be carried back to the bridge approach.

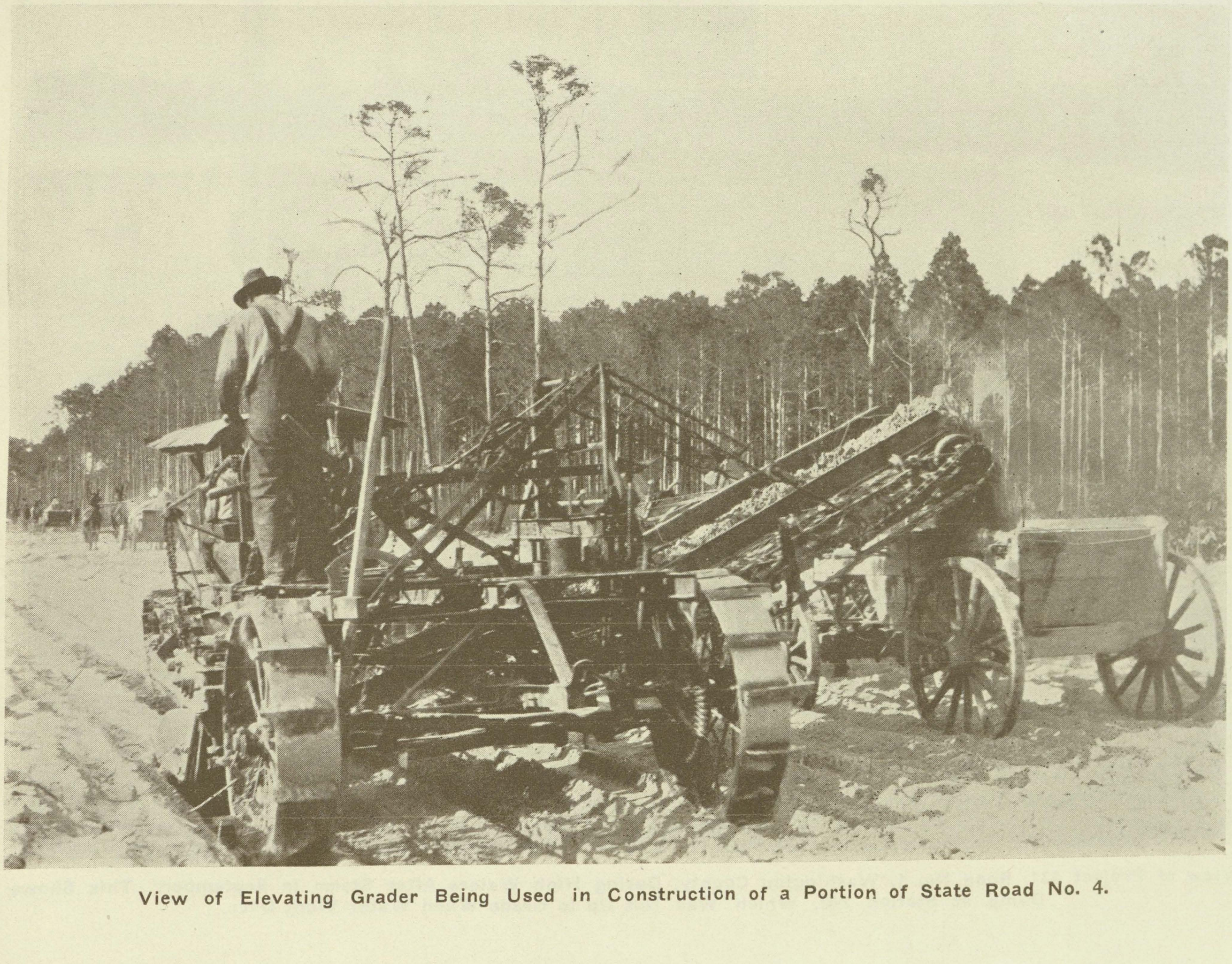
The railings of deck structures should be cantilevered out a generous distance consistent with safe and economic design of the superstructure as these lines are to a bridge about as the eave lines are to a building and two or three shadow lines of graded depth add greatly to the appearance and should, of course, be extended for the full length of the structure except for the breaks in the continuity of the surfaces provided by pilaster treatment. For structures built on a grade, panelling below the cornice or eave treatment should be avoided. Also bridge seats should be built on a level surface and level with each other and the girder faces left as plain as possible. The convergence of horizontal lines of panels in such cases is distinctly awkward and unsatisfactory.

Structures of the deck type should always be used where there is much possibility of future widening of the highway as the through structure is not economically adapted to wide roadways. Michigan has for several years been building through concrete girder bridges in spans up to 90 and 100 feet in roadways up to 24 feet inside of curbs and both with and without cantilevered sidewalks, these structures being designed with curved top and bottom chords. On all of these designs which were drawn as standard intended for general use throughout the State the primary consideration was given to securing a minimum floor depth as our valley crossings are shallow and fill material quite often scarce and the gradients must be held low. In spans of over about 40 feet it was found necessary to exceed the ordinary height of a railing above the curbs in order to provide a proper depth of girder to carry the loads; likewise, to secure a proper end depth for carrying the heavy shears it was found desirable to bracket at the bottom chords at the bridge seats rather than have the entire height project above the curbs. This gave rise to our curved chord girder types the arched lines of which give a pleasing appearance. Since the height above curbs required for 90-foot spans was found to be 11 feet it became desirable to place as large openings as possible above ordinary railing height in order to afford as much of a view of the stream as possible consistent with strength. We have felt that the arched window opening provided all that was to be desired and furnished that relief from a large flat surface which was so much needed. The success of this treatment seems to be a little in doubt judging by newspaper comment, the main criticism being that the stream should have a free and unobstructed view above railing height. The question seems to be one of how much view can be absorbed by an individual in a motor vehicle crossing a narrow stream at high speed without getting out of the car or at least stopping it and of weighing this kind of appreciation of nature against the undeniable economy of this type of structure. A peculiar evidence of the danger of trusting to the artistic sense of an individual picked at random is shown by a recent newspaper clipping in which a very prominent citizen made the unqualified statement in regard to the above type of structure that the "concrete in the massive railings would better serve the public if placed in concrete pavement." Our appreciation of the graceful rainbow arch or Hell Gate bridge is not lessened by this type of criticism.

Making Deck Types Attractive

The deck types we are now building in steel with concrete decks and concrete rail have been made as attractive as possible by the use of concrete fascias on the outside girders, the lines of which harmonize with the lines on the U abutment wings. For the deeper girders and the later types we are carrying this fascia to about mid depth of the steel girders and painting the lower half of the steel girder with a final coat of dark green paint thus forming a very pleasing contrast, emphasizing the white of the concrete work and avoiding the architectural deceit of hiding the steel as happens when the full fascia is used. We have adopted a spindle railing for all of our deck bridges, these spindles being of a rectangular shape the plainness of which is relieved by a triangular moulding and curved offsets yet of so simple a design that the forms are built usually on the job by the contractor. We have found that a solid rail of attractive appearance costs practically as much to build as these spindle railings. Probably 90 per cent of the public which views these deck bridges sees only the railing and therefore more than the usual attention should be given to this part of the structure. In addition the railing is to a bridge pretty much what a necktie is to a man's costume. A proper disposition of pilasters and their relative sizes and location is important in the design of a structure as is also a proper location for lighting units.

A most puzzling difficulty to take care of is the control of and proper waterproofing of contraction and construction joint cracks. We are experimenting on control of contraction cracks by placing a fine moulding at horizontal intervals of about 10 feet in the hope that the slightly necked down section will induce the contraction cracks to fall in the notch and



View of Elevating Grader Being Used in Construction of a Portion of State Road No. 4.

if this is as successful as we hope, it is believed that a bituminous waterproofing can be applied by painting the notch. The disintegration along this type of crack unless waterproofed is very distinctive, progressive, and unsightly and the necessity for protection is fully realized. On the other hand we are investigating the qualities of cement and modifying our mixes, and construction methods with the object of reducing to the minimum the shrinkage factor of the concrete.

With the increased costs of our bridges arising from the use of wider roadways it is quite evident that we can well afford to give a little more consideration to the aesthetic features of bridge design.

—Michigan Roads and Pavements.

Among the men who never attend the class reunions at the school of experience are those who received their diplomas at the grade crossings.—Arkansas Gazette.

STATE OF FLORIDA SPENDING BIG HIGHWAY APPROPRIATION

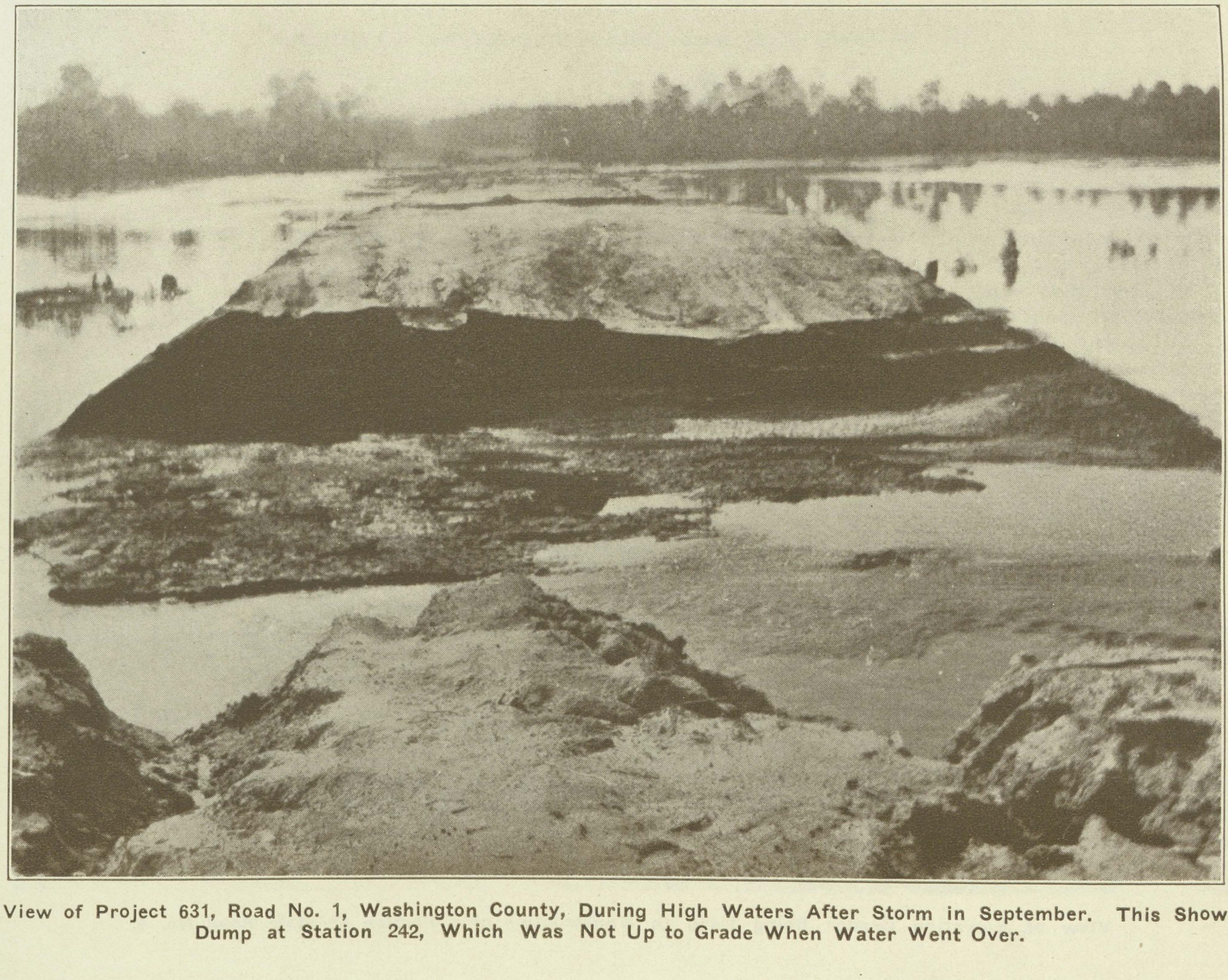
The State of Florida is spending more than $33,000,000 for highway construction this year, according to the Trust Company of Florida. Roads of that State embrace approximately 5,654 miles.—Michigan Roads and Pavements.

HIGHWAY RESEARCH BOARD TO MEET AT WASHINGTON DECEMBER 2

Plans are now being completed for the sixth annual meeting of the Highway Research Board which will be held December 2 and 3, 1926, at Washington, D. C. Arrangements are being made to accommodate an attendance fully as large as last year when 300 were registered, representing 28 States, 25 universities, and two foreign countries.

Reports will be received from the Research Committees of the Board as well as progress reports from special investigations. During the past month, meetings have been held by the Research Committees for the purpose of correlating data for presentation at the annual meeting. The reports and discussions will cover the latest developments in every phase of highway finance, design, construction and maintenance.

Considerable interest is being shown in the Earth Roads Investigation, which is concerned with the study of intermediate type of road surfaces. In addition to conferences held with Federal and State engineers, as well as with representatives of other organizations interested in this investigation, C. N. Conner, who is in charge of the study, has made field inspections in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, New York, New Jersey, Virginia and North Carolina. An important progress report will be presented at the annual meeting. The Board is planning to have an exhibit at the Convention and Road Show of the American Road Builders' Association to be held at Chicago, January 10 to 14, 1927.



View of Project 631, Road No. 1, Washington County, During High Waters After Storm in September. This Shows Dump at Station 242, Which Was Not Up to Grade When Water Went Over.

This Space Contributed by
"Florida Highways"

State Highway Expenditure $650,000,000 Last Year

THE total expenditure by the State highway departments in 1925 for road and bridge construction on the several State highway systems amounted to $649,125,101, according to reports from the highway departments just compiled by the Bureau of Public Roads, United States Department of Agriculture. Of the total expenditure 59.6 per cent was spent for road and bridge construction, 18.4 per cent for maintenance, and 3.5 per cent for materials and equipment. Administrative and engineering costs accounted for 4.7 per cent of the total, interest and principal payments on bonds 7.8 per cent, and miscellaneous expenditures amounted to 6.0 per cent of the total.

To meet these expenses the highway departments received from various sources during the year a total income of $780,081,292 of which $115,656,721 was available as a balance from the previous year's operations, so that the amount of money raised during the year was only $664,424,571. Of the latter amount 43.5 per cent was raised by means of motor vehicle license fees and gasoline taxes, 30 per cent from the former and the balance from the latter. The sale of bonds realized 21.3 per cent of the total for the year, and Federal aid received from the National Government amounted to 13.9 per cent. Funds transferred to the State by the counties and other local governments amounted to 10.8 per cent, and the balance was made up of funds derived from special highway taxes and appropriations and from miscellaneous sources as follows: Taxes, 3.3 per cent; appropriations, 5.0 per cent; and miscellaneous 2.2 per cent.

Although the year's expenditures were slightly greater than the previous year's total of $605,665,207, the balance of $130,956,191 carried over into the current year was even greater than the amount of unexpended funds carried over from 1924. The rate of construction remained about the same as in previous years.

One of the most significant facts brought out by the report is the remarkable increase in the percentage of the total highway income derived from motor vehicle and gasoline taxes, and the falling off in the percentage representing real and personal property taxation. There has been a steady tendency in this direction since 1921: In that year the combined income from motor vehicle licenses and gasoline taxes amounted to 25.9 per cent, the gas tax revenue amounting to less than one per cent. In 1925 the income produced from these sources was 43.5 per cent of the year's total and the gas taxes alone amounted to 13.5 per cent.

In the same period taxes on property specifically for road purposes have dropped from 11.2 per cent

Using an Elevating Grader on the Construction of State Road No. 4 Between St. Augustine and Bunnell.

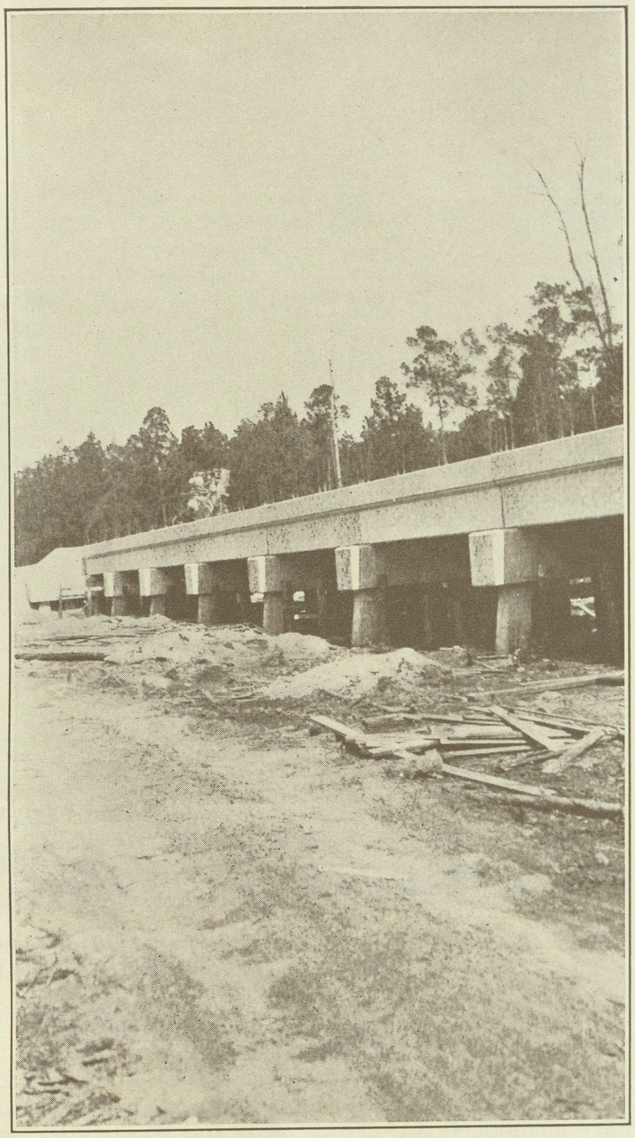
to 3.3 per cent of the year's total income. Including the income from appropriations and miscellaneous sources, most of which is raised indirectly by property taxation, the 1921 percentage was 20.7 and the 1925 percentage was 10.5.

Funds raised by the sale of bonds were also a smaller percentage of the total in 1925 than in 1921, being 21.3 per cent in 1925 as compared with 27.8 in 1921.

The expenditures by the various State highway departments during the year are given in the table below. These figures do not include expenditures by county and local authorities for local roads:

Alabama	$ 10,917.204
Arizona	2,442,947
Arkansas	11,200,000
California	18,090,728
Colorado	5,564,590
Connecticut	8,611,936
Delaware	3,492,841
Florida	8,483,752
Georgia	7,902,428
Idaho	3,636,681
Illinois	36,375,983
Indiana	14,517,794
Iowa	14,107,798
Kansas	7,407,369
Kentucky	14,916,316
Louisiana	8,610,624
Maine	7,105,389
Maryland	12,024,781
Massachusetts	12,880,700
Michigan	36,138,549
Minnesota	17,962,567
Mississippi	4,795,192
Missouri	31,593,937
Montana	1,267,242
Nebraska	5,563,752
Nevada	3,055.959
New Hampshire	4,027,241
New Jersey	23,939,454
New Mexico	3,322,548
New York	49,368,770
North Carolina	32,588,514
North Dakota	1,862,348
Ohio	24,086,289
Oklahoma	12,937,673
Oregon	15,553,453
Pennsylvania	62,294,366
Rhode Island	3,045,859
South Carolina	9,132,953
South Dakota	6,378,176
Tennessee	14,379,189
Texas	19,985,007
Utah	4,123,798
Vermont	3,618,327
Virginia	14,071,555
Washington	7,845,566
West Virginia	16,138,729
Wisconsin	7,784,733
Wyoming	3,973,494
Total	$649,125,101

Dr. Fons A. Hathaway, chairman of the State Road Department, has issued orders for the speeding up of all road work. Florida is already building roads faster than any Southern State.—Times-Union.



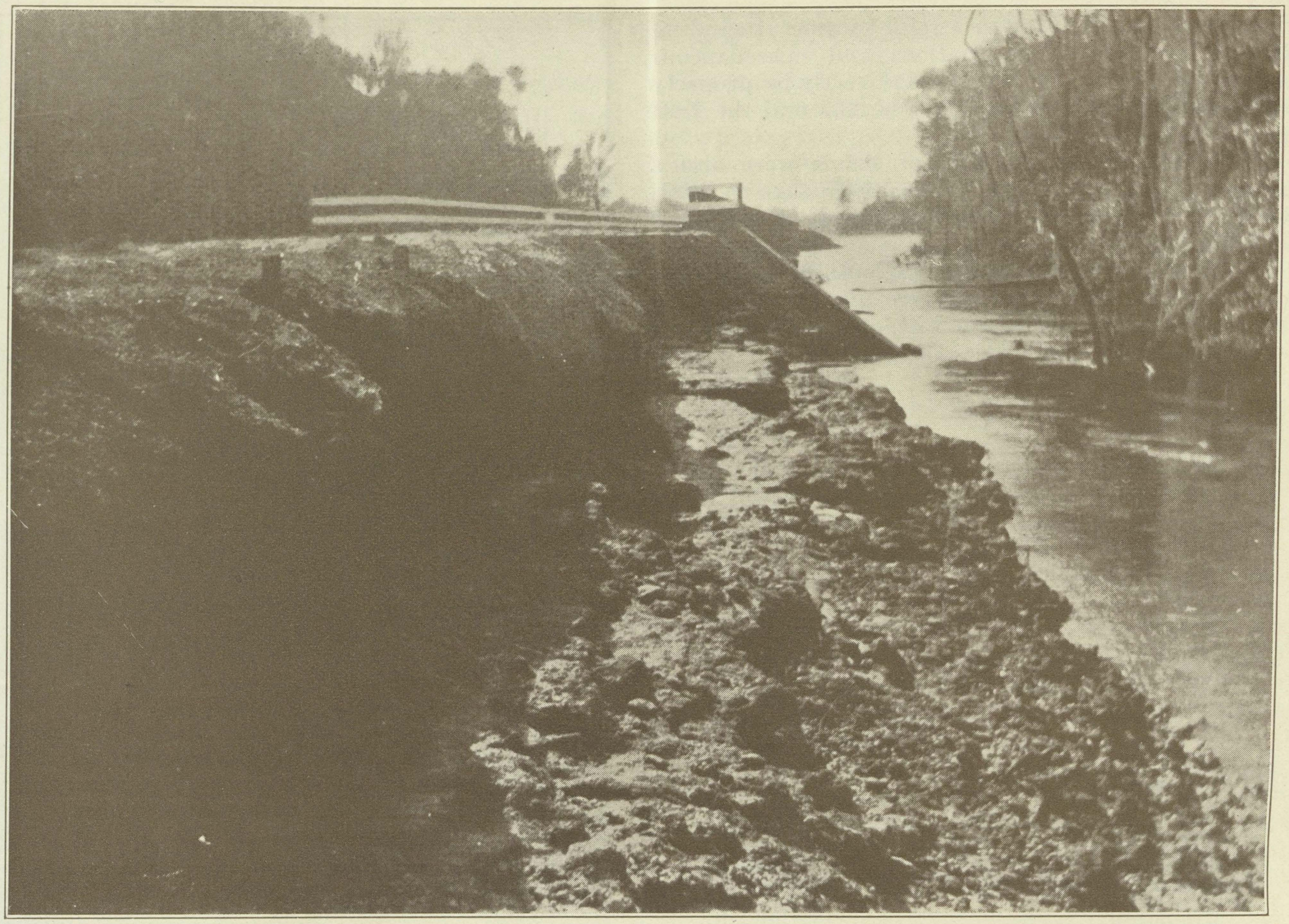
Project 672-B. Gadsden and Leon Counties. Ocklockne River Bridge Under Construction.

FEDERAL-AID ROADS TOTAL 52,526 MILES

Federal-aid roads brought to completion during the fiscal year ending June 30, 1926, amounted to 10,628.3 miles, according to the Bureau of Public Roads. This brings the total mileage of completed Federal-aid roads to 52,526 miles. The new fiscal year was begun with 14,355.1 miles under construction and 2,483 miles approved for construction. There is every indication that progress will equal that of the preceding year.

All Federal-aid funds are being expended in cooperation with the States in the construction of the Federal-aid highway system consisting of 180,000 miles of the most important interstate roads in the country. Provision for the continuation of the work through the fiscal year 1929 was recently made when Congress authorized $75,000,000 for each of the fiscal years 1928 and 1929.—Roads and Streets.

Abolish sleep, as suggested, and destroy the only few hours man lives above reproach.—Toledo Blade.



Project 631, Road No. 1, Washington County. East Abutment of Alligator Creek Bridge During High Water Following Storm. Abutments Did Not Cut Out, Due to Wings, But Slope on Up-stream Side Was Damaged as Shown.

"DETOUR" A SIGN OF REAL PROGRESS

Anathema and satire have been cast at the word "detour" until some State highway departments have abandoned use of the word and substituted the term "temporary road."

In the early days of road construction it often happened that the road provided amounted to little more than an indication of how you could find your way around the section temporarily closed. Nowadays, however, detour is becoming an honorary term because more care is being taken in providing temporary roads and especially because it marks the construction of a better highway.

The student of road construction, the lover of better roads and the extensive motor traveler at heart welcomes the sign "detour" just as he welcomes any other temporary annoyance which he appreciates he must encounter in order that he may later receive a permanent benefit.

Detours are found on the Lincoln Highway in almost every State of the Union. To say today that any highway has been "completed" would be to deny an inexorable law of progress. A highway may today seem completed and adequate for traffic needs which five or ten years from now will appear as obsolete as a last year's bird's nest. When you encounter no new highway construction it is a certain indication that you are in a non-progressive community.—Georgia Highways.

HIGHWAYS TEN-YEAR GROWTH

In 1915 there were only 31 State highway commissions. Today there is a working, active State highway commission in every one of the 48 States. In 1915, the year before we began national aid to roads, there were only 249,291 miles of improved roads in the United States. Now there are 467,933 miles, an increase in 10 years of 210,612 miles of improved roads. In 1915 there was expended $240,263,784 in all of the States in road improvements, and 10 years later, in 1925, the sum went from $240,263,784 to $1,176,000,000, a gain of $936,736,216.—American Highways.

And Sometimes W and Y

A schoolboy, instructed to write an essay on the subject, Man, submitted the following:

Man is composed of three parts, his cranium, his borax, and his abominable cavity.

In his cranium are his brains, if he has any.

In his borax are his liver and his lights.

In his abominable cavity are his vowels, five in number, a, e, i, o, and u.—Earth Mover.

The Precocious Thing!

Baby—"Googly ikkle woople zump."

Fond Mother—"Yes, dear, that's the public library."—M. I. T. Voo Doo.

Jack Camp, President. E. F. Fitch, Vice-President. Clarence Camp, Sec. and Treas.

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TRANSACTIONS OF THE DEPARTMENT

(Continued from Page 3.)

Be It Resolved by the State Road Department, that the proposal of St. Lucie County as contained and set forth in the foregoing resolution be, and the same is hereby, accepted and approved, and that the Chairman of this Department be, and he is hereby, authorized to advertise for bids and let contract or contracts for the construction of that portion of State Road No. 4 in St. Lucie County between the north line of said county and the south City limits of the City of Fort Pierce in said county, known as Project No. 692.

State Road No. 5—Present Wooden Bridge Over Manatee River

Upon motion of Mr. Green, seconded by Captain Hillman, the following resolution was unanimously adopted:

Resolved, That the State Road Department assist the County of Manatee in the maintenance of the present wooden bridge over Manatee River between Bradenton and Palmetto to the extent of 50 per cent of the cost of such maintenance, the county to furnish proper and certified bills of such cost of maintenance to be approved by the Department's Engineer.

Be It Further Resolved, That this assistance shall become effective as of and from October 1st, 1926, and continue until the Department's bridge between the same cities is opened to traffic.

Expense Accounts

Upon motion of Mr. Schilling, seconded by Mr. Green, the expense accounts of the members were approved and ordered paid.

There appearing no further business, the Department was adjourned.

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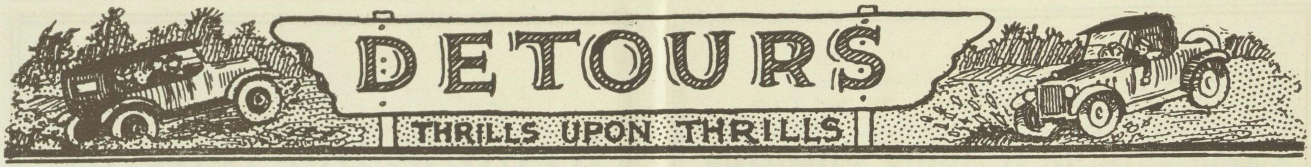

Pome of Passion

If you were a rose, love,
And I were a bee,
I wonder if you'd let me
Sit on your knee.
—Phil Armstrong, in Florida Times-Union.

If a rose should do that
'Twould her whole life embitter,
Because a bee has
Such a superhot sitter.
—Judd Lewis, in Houston Post-Dispatch.

Must Be Dangerous

The wife of a naval man handed the pastor this note: "Peter Bowers, having gone to sea, his wife desires the prayers of the congregation for his safety."

The minister glanced over it hastily and announced: "P. Bowers, having gone to see his wife desires the prayers of the congregation for his safety."

The Little Tourist

Betty was taking her first ocean voyage, and for the first three days the sea was smooth as glass. On the fourth day out, a squall came up and the good ship bounced like a broncho.

"Mother," finally asked Betty, "what's the matter? Are we on a detour?"—California Highways.

Hardly Dry at That

A poet who wished to write a verse on the sea was lashed to the mast of a small schooner and taken out in a heavy storm. This seems like a drastic measure, but very likely he broke loose and wrote it anyhow. —Exchange.

And Hand Laundered Napkins

Customer—"Two eggs poached medium soft, buttered toast not too hard, coffee not too much cream in it."

Waiter—"Yes, sir. Would you like any special design on the dishes?"—Tit-Bits.

Little Lessons in Etiquette

Brain your baby, shoot your man,
Overlook these things I can;
But I'd be mortified, my sweet,
If with your fingers you should eat.
—Ema Spencer, in Newark Advocate.

Strangle your wife with her hair,
Smash your daughter with a chair,
Keep your home embroiled in strife
But do not eat peas with your knife.
—Houston Post-Dispatch.

Hit poor grand-dad with an axe,
In grandma's mince pie put some tacks,
Wear clothes ruined by mould and moth,
But don't wipe your mouth on the tablecloth.
—Florida Times-Union.

Too Hard for Us

Some day a magazine editor is going to achieve lasting fame by publishing stories as interesting as the advertisements.—Life.

An Eskimo, brought to New York on a sight-seeing tour, describes the American girl as "onnanutziak." That leaves only "onna" and "ziak" to be explained. —Detroit News.

Alas! in every town that claims to be the Athens of America, 32 per cent of the people don't know what Athens was.—Greenville News.

Drawing the Line

The Bachelor—"How we change as we grow older!"

The Divorcee—"Yes, d'you know, I used to marry men I wouldn't invite to dinner now!"—The Sketch.

One on Dad

To Tom, who had been cutting up, his mother exclaimed wearily—"Why can't you be a good boy?"

"Well, Mother, I'll be good for a nickel."

Mother—"For shame, you ought to be like your father, good for nothing."—The Open Road.

Words, Idle Words

A Chicago newspaper points out that the Government prints and distributes the speeches made by Congressmen without the slightest profit. It might also be added they are read the same way.—Judge.

Canning the Preliminaries

Young Son (to shoe clerk waiting upon his fastidious mother)—"No use showing her the first ten pairs—she won't take 'em."—Life.

Putting on Airs

Angry Customer in Restaurant—"Hey, I've found a tack in this doughnut!"

Waiter—"Why, the ambitious little thing! It must think it's a tire!"—The Open Road.

And an Optimist

The man who hides behind a woman's skirt nowadays is not a coward. No, sir, he is a magician.—Yellow Truck & Coach Co. "Factory News."

Leaves No Room for "Neuter"

Teacher—"Johnny, what are the two genders?"

Johnny—"Masculine and feminine. The masculine is divided into temperate and intemperate and the feminine into frigid and torrid."—American Legion Weekly.

Bum Shot

Hubby—"I miss the old cuspidor since it's gone."

Wifey—"You missed it before—that's why it's gone."

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Our Woodward Plant (destroyed by fire July 6th, 1926) has been rebuilt with the most modern Crushing and Screening equipment. This new plant is producing a material unexcelled in correct and uniform sizing.

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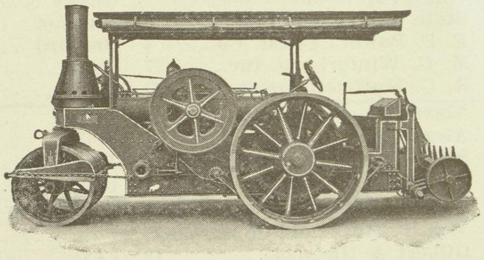

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Status of Road Construction

THROUGH SEPTEMBER 30th, 1926

Project No.	Contractor	Road No.	County	Total Length Miles	Clearing Miles	Grading Miles	Base Miles	Surface Miles	Type	Per Cent Complete
7	Duval Engr. & Contr. Co.	2	Hamilton	13.00			3.04	0.00	S.T.	21.00
31	Duval Engr. & Contr. Co.	2	Hamilton	11.82			11.82	8.00	S.T.	98.00
40-A	C. F. Lytle	4	Brevard	16.17	16.17	16.17	16.17	16.17	S.T.	100.00
41	Morgan-Hill Paving Co.	4	Dade	12.00	12.00	11.40	6.60	0.00	S.A.	54.00
47	Boone & Wester	4	St. Johns	14.96	14.96	14.96			G.	98.00
48	A. J. Hoffman	4	St. Johns	15.94	15.94	13.07			G.	85.00
49	A. J. Hoffman	4	Flagler	13.21	12.43	2.76			G.	36.00
50-A	Boone & Wester	14	Putnam	6.18	0.00	0.00			G.	0.00
50-B	B. Booth & Co.	14	Putnam	9.77	9.42	7.40			G.	70.00
50-C	E. Roy James	14	Putnam	10.03	0.00	0 00			G.	0.00
51	Noonan-Lawrence	7	Escambia	6.28	6.28	6.28		6.28	Conc.	100.00
53-A	B. Booth & Co.	2	Lake	7.11	6.13	3.20			G.	59.00
500-A	Noonan-Lawrence	20	Bay	9.65	8.00	5.00		0.00	Conc.	20.00
504	Duval Engr. & Contr. Co.	1	Columbia	9.41			.56	0.00	S.T.	5.50
514	State Convict Forces	1	Jackson	11.04	7.73	4.08		2.76	S.C.	41.98
529	M. C. Winterburn, Inc.	1	Suwannee	12.70				0.00	Conc.	0.00
533	Baker & Foulks, Inc.	1	Suwannee	13.47			.61	0.00	S.T.	5.00
543	Lake Worth Const. Co.	3	Seminole	14.20	8.52	3.55			G.	25.10
562-A	H. E. Wolfe	8	Highlands	5.37			5.37	4.50	S.T.	95.00
564-C	E. F. Powers Const. Co.	5	Charlotte	3.94	3.15	1.57			G.	40.00
564-B	Broadbent Const. Co.	5	Charlotte	9.73			1.65	0.00	S.T.	16.00
565	Johnson, Drake & Piper	1	Madison	15.99				0.00	Conc.	0.00
589	H. E. Wolfe	5	Lee	8.16			1.96	0.00	S.T.	21.00
595	L. M. Gray	3	Volusia	6.43			4.76	0.00	S.T.	72.30
613	Broadbent Const. Co.	5	Sarasota	4.62	4.62	4.62	4.62	3.46	S.A.	91.00
614	Walter J. Bryson Pav. Co.	5	Sarasota	17.07	12.80	3.41			G.	35.30
617 & 618	L. M. Gray	5	Alachua	16.07			13.33	0.00	S.T.	73.00
619	J. L. Gladwell	5	Alachua	9.28	0.00	0.00			G.	0.00
621	Penton-Mathis Const. Co.	1	Okaloosa	17.35	16.48	13.88			G.	78.90
623	State Convict Forces	35	Madison	12.91	12.91	12.00		0.00	S.C.	71.00
631	E. P. Toulmin	1	Washington	8.53	8.53	7.25			G.	86.00
634	State Convict Forces	1	Jackson	11.07	11.07	11.07		11.00	S.C.	96.00
641-A	Chas. F. Wilmore	4	Palm Beach	11.36	9.35	5.57			G.	55.00
642	F. S. Whitney	3	Putnam	10.82			9.09	8.00	S.T.	85.00
644-A	Gillis Const. Co.	10	Wakulla	8.49	8.36	8.36			G.	95.40
648-A	Southern Surety Co.	2	Hardee	14.17	14.17	13.00			G.	85.00
651	State Convict Forces	10	Gulf	14.72	13.50	10.00		1.00	S.C.	34.00
652	Penton-Mathis Const. Co.	33	Okaloosa	9.04	9.04	9.04		8.50	S.C.	99.00
655 (Sec. 1)	H. E. Wolfe	18	Highlands	13.26	13.26	13.26	13.26	9.00	S.T.	97.00
655 (Sec. 2)	H. E. Wolfe	18	Highlands	5.00	1.74	1.48	0.00	0.00	S.T.	25.00
657	State Convict Forces	6	Jackson	10.00	10.00	9.50		9.00	S.C.	90.00
658	Myers Const. Co.	1	Holmes	8.21	8.21	7.60			G.	90.00
659	M. C. Winterburn, Inc.	3	Clay	13.27	0.00	0.00			G.	0.00
660	B. Booth & Co.	3	Clay	10.52	10.52	10.41			G.	95.00
660	Langston Const. Co.	3	Clay	10.52			0.00	0.00	S.T.	0.00
663	Wm. P. McDonald Const. Co.	5	Citrus	8.03			0.00	0.00	S.T.	0.00
666	State Convict Forces	6	Jackson	6.52	6.52	6.52	5.00	0.00	S C.	97.00
668	E. F. Powers Const. Co.	4	Brevard	13.45	7.53	2.69			G.	15.00
669-B	M. C. Winterburn, Inc.	27	Dade	10.32	10.32	10.32	9.08	0.00	S.T.	85.00
669-C	R. C. Huffman Const. Co.	27	Dade	12.00	0.00	0.00			G.	0.00
669-V	Alexander, Ramsey & Kerr	27	Collier	11.91	5.95	2.38			G.	20.30
669-X	Alexander, Ramsey & Kerr	27	Collier	9.39	8.45	2.35			G.	24.00
670	State Convict Forces	6	Jackson	12.30	12.30	11.00		10.50	S.C.	85.00
672	State Convict Forces	1	Leon	9.92	9.92	9.42		9.42	S.C.	95.00
673	State Convict Forces	1	Gadsden	9.90	8.00	7.50		5.00	S.C.	65.00
675	Wm. P. McDonald Const. Co.	17	Polk	5.16	5.06	4.90	1.03	0.00	S.A.	34.00
676-A	Gilbert & Hadsock	19	Levy	9.95	9.95	6.47			G.	71.00
676-B	McLeod Const. Co.	19	Levy	14.39	11.51	9.35			G.	64.00
676-C	Langston Const. Co.	19	Levy	13.93	3.00	0.00			G.	4.00
677-A	A. J. Hoffman	13	Levy	6.96	1.60	0.00			G.	4.50
679	Wm. P. McDonald Const. Co.	5	Hernando	7.12			0.00	0.00	S.T.	0.00
682	Caye-Andrews Co., Inc.	5	Citrus	6.46	6.46	6.01			G.	95.00
682	L. B. McLeod Const. Co.	5	Citrus	6.46			1.42	0.00	S.T.	22.00
687-A	E. W. Ellis	2	Lake	15.00	6.00	2.25			G.	17.00
693	Boone & Wester	4	St Lucie	8.73	8.58	4.37			G.	32.90
694	C. A. Steed & Sons	4	Martin	8.48	8.05	2.88			G.	32.00
	Total Complete September 30, 1926				1654.46	1675.73	686.60	1271.13		
	Complete Month of September				53.22	27.35	25.42	26.99		
	Total Complete August 31, 1926				1601.24	1648.38	661.18	1244.14		

TOTAL MILEAGE COMPLETE

	Concrete	Brick	B.C.	S.A.	B.M.	Asp. Blk.	S.T.	S.C.	Marl	Total
Complete to August 31, 1926	114.91	17.15	10.74	67.21	89.07	23.20	478.63	463.44	45.86	1,309.31
Complete month of September	.32			2.26			20.30	3.39		26.27
Total to September 30, 1926	115.23	17.15	10.74	69.47	89.07	23.20	498.93	466.83	45.86	1,335.58

Makes Good Roads Better

The demand of the hour is not merely for good roads—but BETTER roads! And especially noteworthy is the dependence placed by the big, busy road builders in pure Blast Furnace

"ENSLEY" & "ALA CITY"
BASIC SLAG
CRUSHED & SCREENED

Back of this dependence is confidence—confidence born of multiplied experiments in all sections and in all types—confidence confirmed in the consistent success obtained with Basic Slag—in a total of more than 1,000 miles of hard surface, all-weather highways! 4 plants, 6,300 tons daily!

Birmingham Slag Company
Slag Headquarters for the South
ATLANTA
THOMASVILLE
BIRMINGHAM
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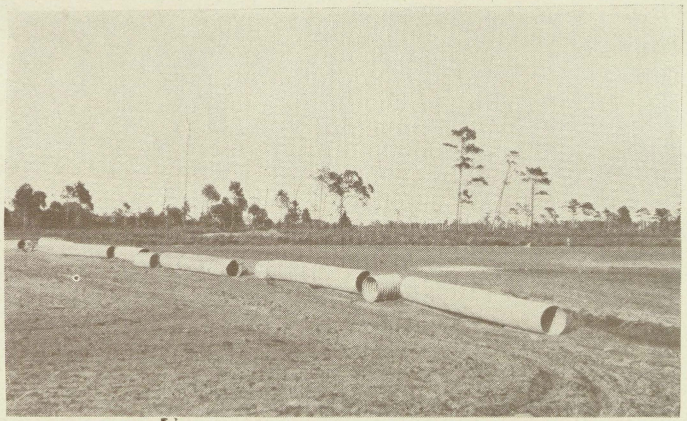
BASIC SLAG
For better Roads



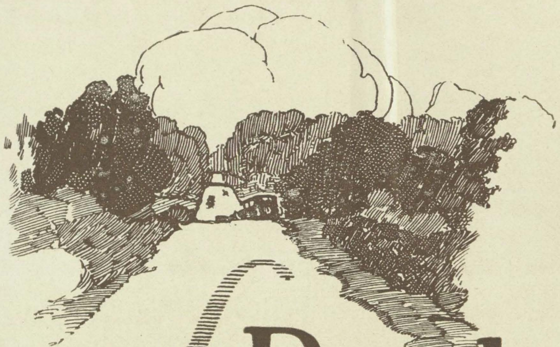
ARMCO
Ingot Iron

ARMCO, *of course!*

When 150 feet of 18" Armco Culvert was laid in this small creek at Venice, Florida, the work took about one-sixth the time that would have been needed to install rigid type of pipe—and the engineers knew they were installing the culvert of greatest permanency.

For strength, long life and low cost, use ARMCO for road culverts.

For Information, Write
DIXIE CULVERT & METAL COMPANY
JACKSONVILLE, FLORIDA



Lime Rock Lasts!

OF COURSE you know the road between Gainesville and High Springs, the first road in the state with a Lime Rock base, economically built, with good drainage, and well surfaced.

After eight years of punishment still eager for more!

Lime Rock lasts!

Road builders have had such satisfactory experience with Lime Rock, several hundred miles of Florida highway now boast this unexcelled base. And most recently Lime Rock was specified to support the long, smooth 130 miles between Lake City and Leesburg. Two striking endorsements of Lime Rock—the experience of eight years in service, and the judgment of men who promised a **good road** over the longest single distance for which Lime Rock has thus far been used. Their choice parallels the decision of the Government, which approved this base for its own roads in Florida, and further strengthens the endorsement of scientists who have made the most searching tests.

Your roads should have a Lime Rock base. As a Florida product the quarries make supplies quickly accessible at a low transportation cost; nor is there ever danger of shortage of materials, with resources easily in sight to build more than a hundred roads even longer than the road from Lake City to Leesburg!

Lime Rock works well in road construction, its chemical make-up causing it to crush solidly, bind itself without the extra cost of added materials and harden into a compact, resilient base which gives added life to the surface. Here is a unique combination of moderate cost and lasting quality, an economy for the taxpayer and a community benefit.

Roads built for service need a Lime Rock base.

Lime Rock Is the Life of the Highway

A FLORIDA PRODUCT

FLORIDA LIME ROCK
ASSOCIATION

P. O. Box 1081

JACKSONVILLE, FLORIDA